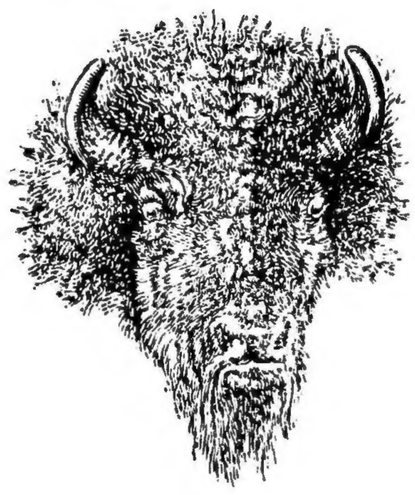
LABORATORY & WORKSHOP APPLIANCES

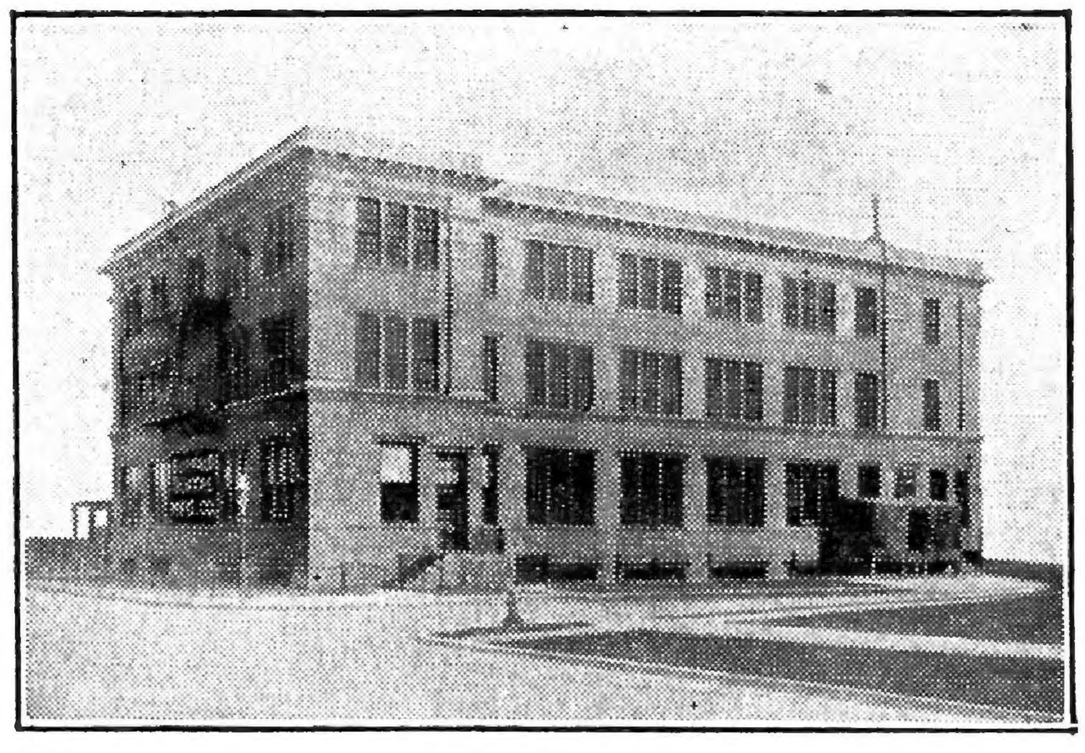
Burning Gas,
Gasoline and Kerosene
For Colleges, Schools,
Chemists, Assayers,
Manufacturing Jewelers,
Experimental Laboratories,
Workshops and
Tool-Rooms

CATALOG
LIST No. 36
1913

B



BUFFALO
DENTAL
MFG. CO.
BUFFALO,
N.Y., U.S.A.



THE HOME OF
BUFFALO LABORATORY APPLIANCES

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This is Catalog B.
List No. 36, 1913.

Buffalo Dental Manufacturing Company

LABORATORY & WORKSHOP APPLIANCES

FOR COLLEGES, SCHOOLS, CHEMISTS, ASSAYERS, MANUFACTURING JEWELERS, EXPERIMENTAL LABORATORIES, WORKSHOPS AND TOOL-ROOMS

List No. 36 September, 1913

CATALOG

B

1913

PRICES IN FORMER CATALOGS ARE HEREBY CANCELLED

BUFFALO DENTAL MANUFACTURING CO.,
BUFFALO, N. Y., U. S. A.,
Factory and Wholesale Department, Kehr Street, Corner Urban.
RETAIL DEPARTMENT
Nos. 587 and 589 MAIN STREET, COR. CHIPPEWA.

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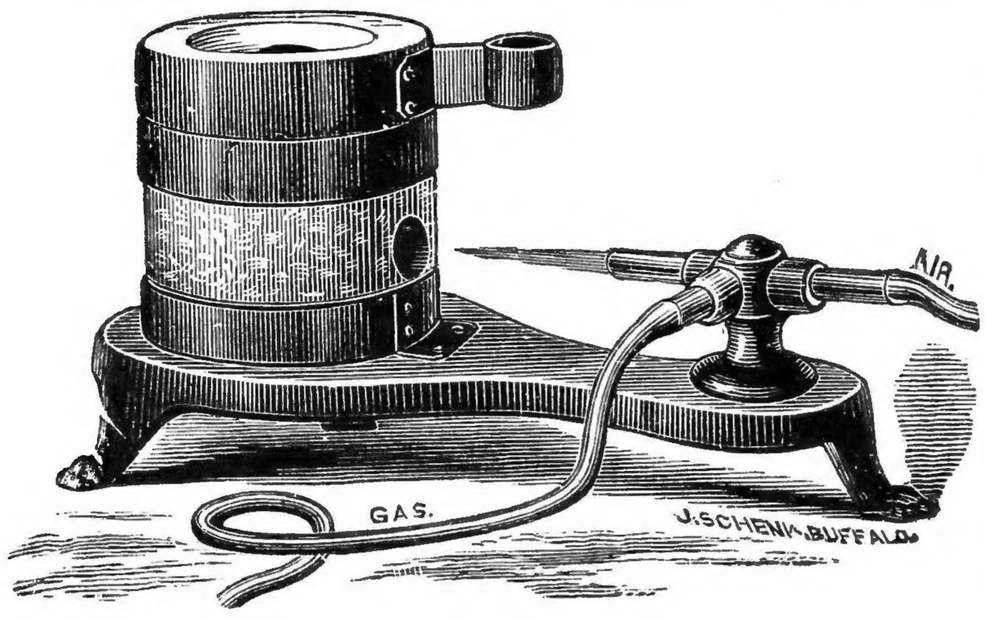
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Y's, Brass 64

GAS FURNACES REQUIRING BLAST.

No. 40. FLETCHER'S CRUCIBLE FURNACE. Owing to the discovery by Mr. Fletcher of a singularly perfect non-conducting furnace casing, we were enabled to produce the first really simple gas furnace ever constructed. This material is only about one-sixth the weight of fire-clay, and has not one-tenth its conducting power for heat. The furnace consists of a simple pot—for holding the crucible—with a lid, and a blowpipe, all mounted on a suitable cast-iron base.

The casing holds the heat so perfectly that most refractory substances can be fused with ease, using a Fletcher foot-blower. This furnace is extensively used by jewelers and dentists for melting gold and silver. The crucible will hold about ten ounces of gold. The power which can be obtained is far beyond what is required for most purposes.



No. 40.

Gas from a ⅜-inch supply pipe will work it efficiently. About ten cubic feet of gas per hour is sufficient for most purposes.

Will burn illuminating gas only.

The No. 9A or No. 10A Foot-Blower will operate the furnace satisfactorily. No. 40 takes No. 00 Crucible.

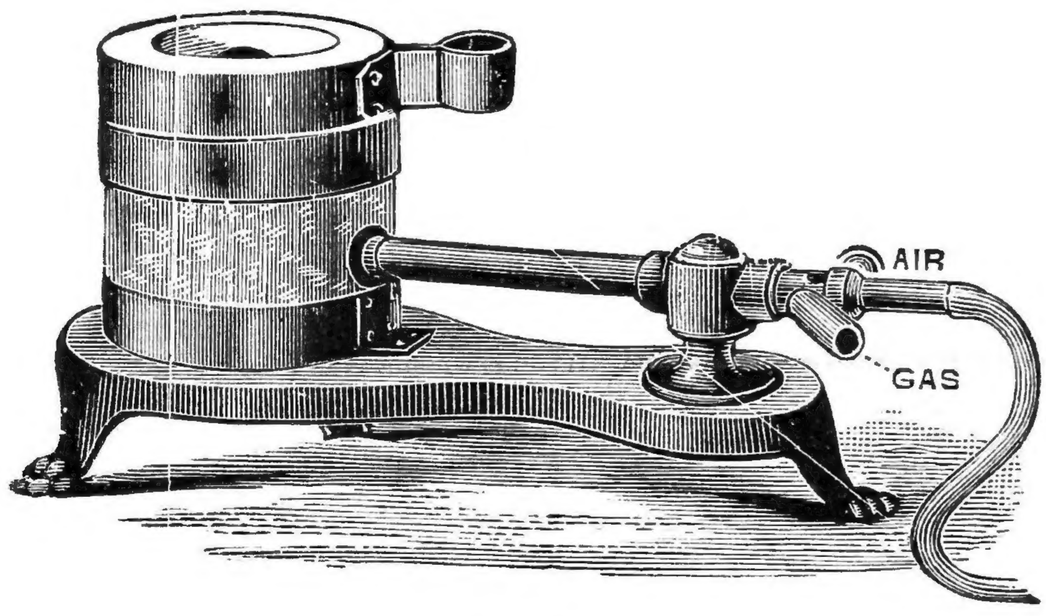
Outside dimensions of clay parts, 4⅛ in. by 5⅜ in. high. Pot inside, 2⅝ in. diameter by 2½ in. deep. Furnace on stand, 6½ in. high over all.

Keep all fluxes away from furnace casing.

PRICES:

No. 40.	Fletcher's Crucible Furnace, with one No. 00 Clay Crucible, without Foot-Blower,	$3.50
No. 40.	Extra Furnace Body,	1.10
No. 40.	Extra Furnace Cover,	.50
No. 40.	Extra Furnace Body and Cover,	1.60
No. 40.	Burner only,	1.00
No. 40.	Stand, less Burner,	.90
	Plumbago Crucibles, No. 00, each,	.27
	Buffalo Clay Crucibles, No. 00, each,	.08

No. 40A. CRUCIBLE FURNACE WITH INJECTOR GAS BURNER. This burner is made of the same pattern as that used in the "Perfected" Injector Furnace. It is almost noiseless in its action, and works with a very small gas supply, producing much more economical results than any gas burner heretofore used for the purpose of heating furnaces. Gas supply pipe required, ⅜-inch. Gas consumption approximately 10 feet per hour. Will operate with illuminating gas, natural gas or gasoline gas without alteration. The amount of air and gas used by this furnace is very small. A steady blast of air will give the best results.



No. 40A.

No. 9A or No. 10A Foot-Blower is recommended for this furnace.

No. 40A takes No. 00 Crucible.

Same dimensions as No. 40.

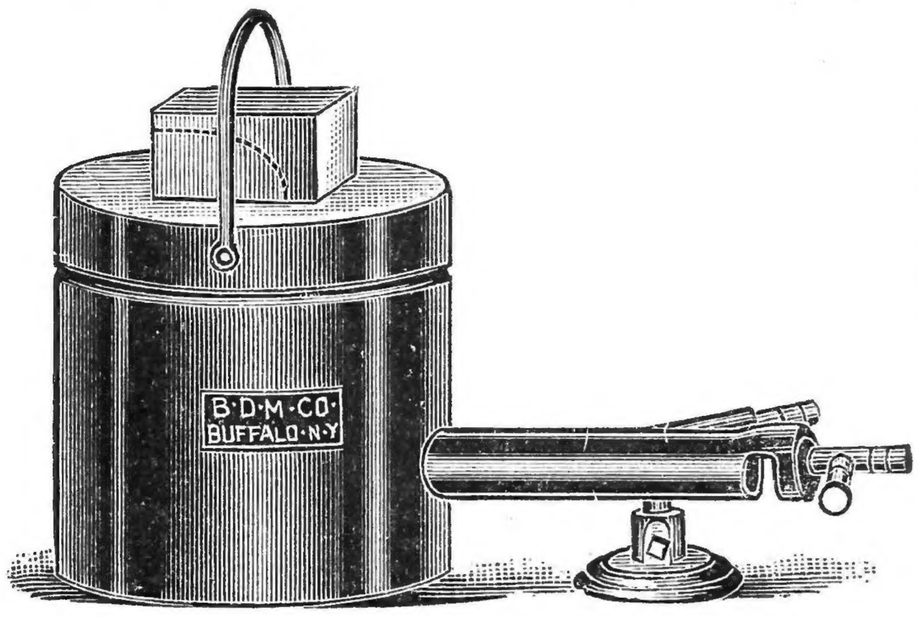
See illustration of No. 40A Furnace, as used in connection with No. 40C Gasoline Gas Generator. Also successfully used in connection with No. 45 Generator.

Keep all fluxes away from furnace casing.

PRICES:

No. 40A.	Crucible Furnace, with one No. 00 Clay Crucible, without Foot-Blower,	$4.00
	Extra Burner,	1.50
	For prices of Furnace parts, see No. 40.	

No. 41, No. 41A and No. 41B. FLETCHER'S INJECTOR GAS FURNACES. No. 41 takes No. 1 crucible; capacity 2 lbs.; Gas consumption approximately 20 feet per hour. No. 41A takes No. 3 crucible; capacity 6 lbs; Gas consumption approximately 30 feet per hour. No. 41B takes No. 8 crucible; capacity 24 lbs.; Gas consumption approximately 50 feet per hour and takes No. 41A burner. For metallurgists, jewelers, chemists, manufacturers of artificial gems, and other purposes where an ordinary furnace is useless or unreliable. This furnace, founded on the well-known Injector Furnace, is without question, the best and simplest gas furnace made. The burner is in one casting, and there is no tendency for the nozzle to become overheated. May be used with illuminating gas, natural gas, or gasoline gas without alteration.



No. 41, 41A and 41B.

See Gasoline Gas Furnaces for illustration of furnace rigged for gasoline gas. No. 41 takes No. 9A or No. 10A Blower. No. 41A takes No. 9B or No. 10B Blower. No. 41B takes 9B or 10B Blower and for operation at its highest efficiency should have power blower.

No. 41 pot and cover dimensions: outside 6½ in. diameter by 7¼ in. high; inside 3½ in. deep by 3½ in. diameter.

No. 41A pot and cover dimensions: outside, 9 in. diameter by 10 in. high; inside, 5½ in. deep by 4¾ in. diameter.

No. 41B pot and cover dimensions: outside 12 in. diameter, 14 in. high; inside 6½ in. diameter, 9½ in. deep. Fluxes must be kept away from the furnace casing.

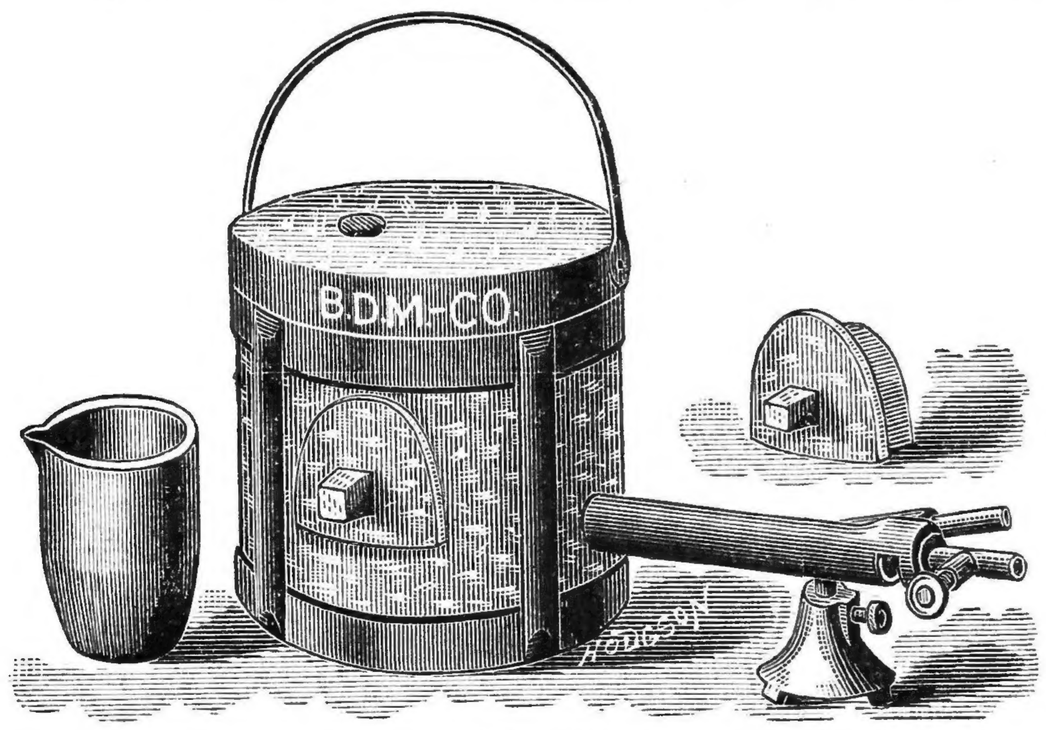
PRICES:

No. 41. Furnace, with one No. 1 Crucible, without Foot-Blower, . . . $5.00
No. 41A. Furnace, with one No. 3 Crucible, without Foot-Blower, . . . 7.00
No. 41B. Furnace, with one No. 8 Crucible, without Foot-Blower, . . . 15 00

PRICES FOR SEPARATE PARTS:

No. 41. Body, ... $2.75
No. 41. Body, Cover and Dome, 3.50
No. 41. Cover, ... 1.00
No. 41. Dome, ...20
No. 41A. Body, ... 4.00
No. 41A. Body, Cover and Dome, 5.00
No. 41 or 41A. Crucible Support, .15
No. 41A. Cover, ... 1.25
No. 41A. Dome, ...25
No. 41B. Body, ... 10.50
No. 41B. Body, Cover and Dome, 12.50
No. 41B. Cover, ... 2.00
No. 41B. Dome, ...25
No. 41. Burner, ... 1.50
No. 41A. Burner, ... 2.00

No. 141, COMBINED CRUCIBLE AND MUFFLE FURNACE. This is supplied with muffle fittings, and can be used either as a crucible or muffle furnace.



No. 141

The body of the furnace is large enough to receive a No. 6 Crucible, holding 12 pounds of metal. The cover has a projection on one side, which will reduce the height of the cavity of the furnace some two inches, or to the proper size to receive the muffle or a No. 3 Crucible. By reversing the cover, a No. 6 Crucible may be used. Used with either illuminating gas, natural gas or gasoline gas without alteration. For gasoline gas generator, see No. 44.

No. 141 pot and cover outside 9½ in. diameter by 11 in. high; inside 6½ in. deep by 6 in. diameter.

PRICES:

No. 141. Crucible and Muffle Furnace, for gas, with Muffle and No. 3 Crucible, without Foot-Blower, ... $11.00
No. 141. Fire Clay Body, Cover and two Plugs only, ... 7.50
Extra Plumbago Muffles, 3½ x 2⅞ x 6¼ in., ... 1.50

Use the No. 9B or No. 10B Foot-Blower with this Furnace. The gas supply must be from a ½-inch or, still better, a ¾-inch pipe and clear way tap.

No. 41H. FLETCHER'S LECTURE AND EXPERIMENTAL FURNACE. Working with the same burner as a draft or blast furnace at any temperature and adapted for crucibles, muffles, tubes, cupels, distillation by descension, treatment of refractory substances with gases at high temperatures, small forgings, roasting ores, etc.

This furnace is especially designed for the lecture table, and has, we believe, power and capabilities equal to any demands which may be made on it. It must be remembered that, although the power of the burner is almost without limit, it is not possible at present to supply any furnace casing which will stand excessively high temperatures, or the contact of fluxes, without damage. Although not silent when in use at the highest power, it is much less noisy than the injector furnace. When used as a blast furnace, it is mounted as shown in Fig. 1.

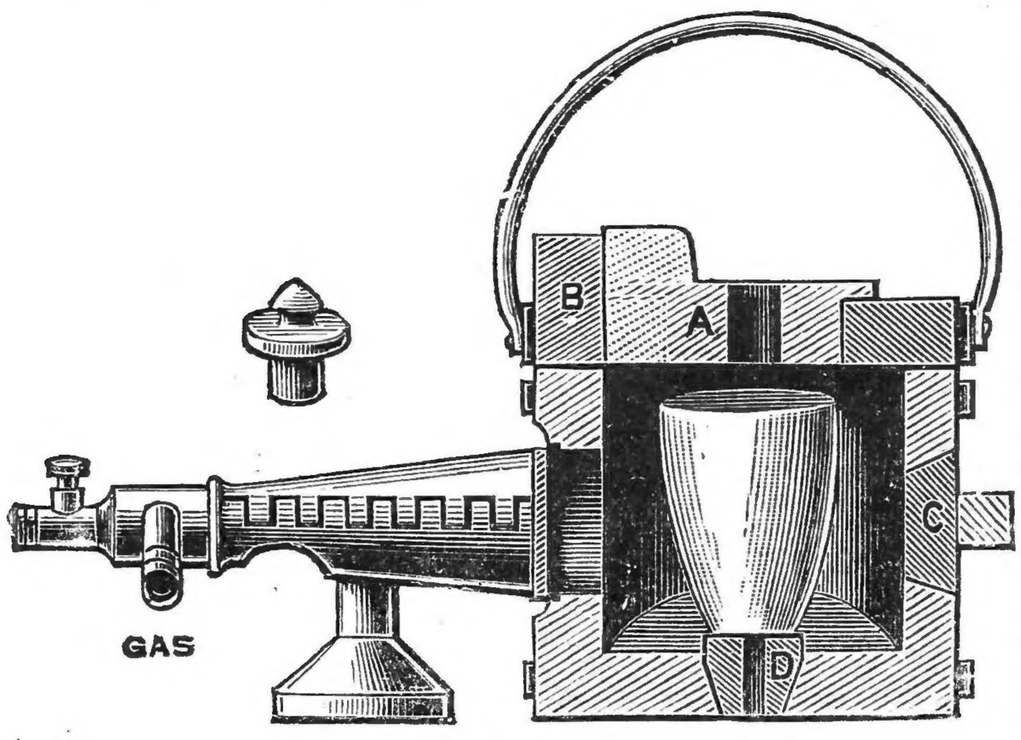


Fig. 1.

When the plug C (Fig. 1) is removed and replaced by the chimney pipe, the foot-blower being stopped, it will raise the crucible to bright redness in about ten minutes. This requires the gas to be turned very low, and the adjustment of the gas as a draft furnace requires some little practice to obtain the best results. If the gas is in excess it burns at the top of the chimney instead of in the furnace, and, of course, does not work. The best results are obtained when the gas is connected to the straight jet, but it will work as a draft furnace fairly well if the gas is connected at the side jet in the same way as when used for blast, but, of course, with a much smaller supply of gas. By turning the casing on its side, as shown in Fig. 3, the contents may be seen by the class whilst the furnace is working, and in this position it can be used for crucibles, muffles, combustion tubes, cupels, or roasting; and with either draft or blast, according to the temperature required.

The plug D is perforated for distillations by descension, and when removed will admit of a one-inch combustion tube being passed through the furnace. When used with blast, the instructions of the Injector Furnace must be followed, the only difference being that the Lecture Furnace is more silent than the Injector Furnace and about twice as quick in working.

The crucibles are No. 0 size, and larger sizes must not be used.

For either coal gas or gasoline gas, without alteration.

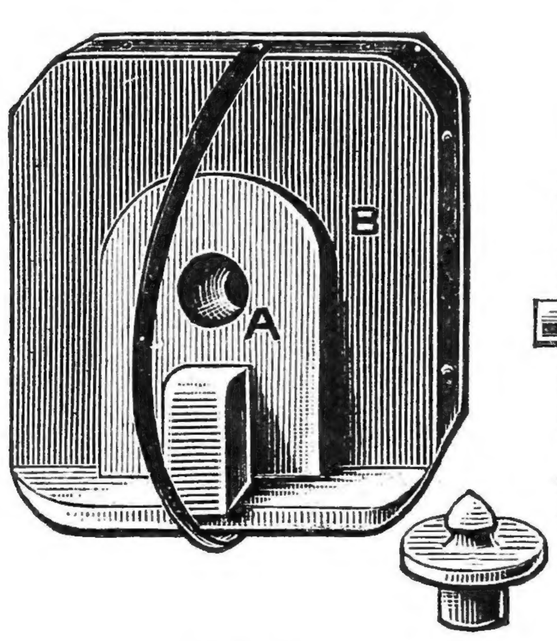


Fig. 2.

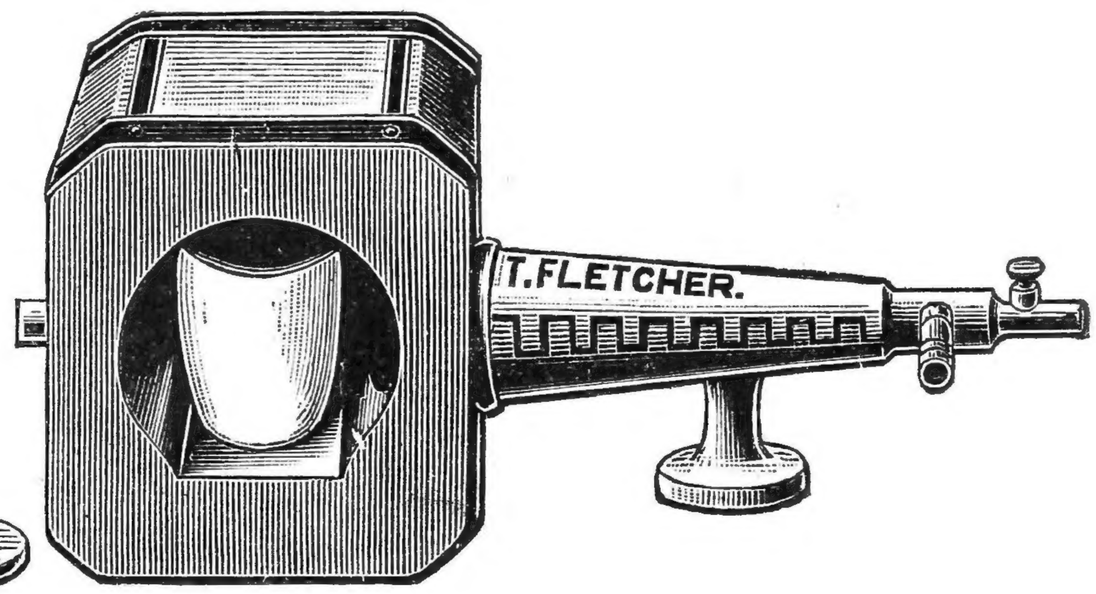


Fig. 3.

NOTE.—When used with a blast and the air is in excess, the burner is liable to scream. If it does so, it is a sign that the gas supply is deficient for the blast used. When the lid is lifted, close the revolving burner slide.

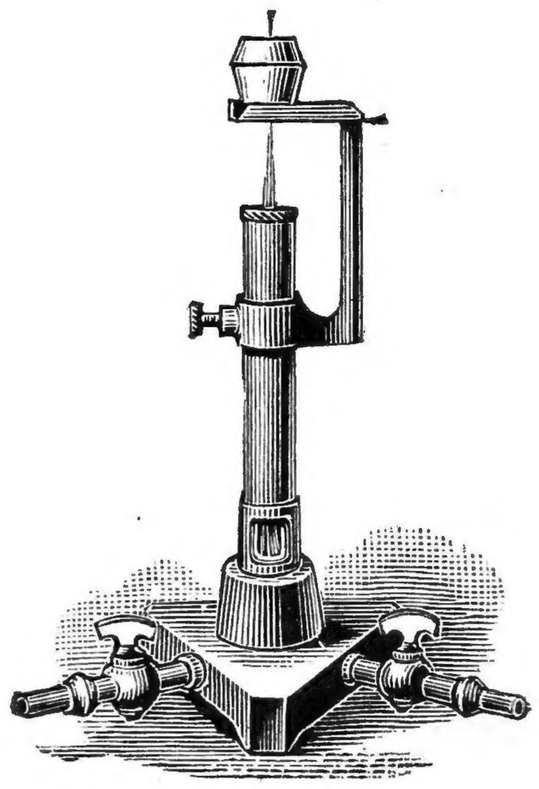
PRICES:

No. 41H. Fletcher's Experimental Furnace, with Muffle and No. 0 Crucible, without Foot-Blower,	$25.00
Burner alone,	7.50
Extra Muffles, Salamander,	1.00
Extra Muffles, Fire clay,	.50

FLETCHER-PLATTNER BLOWPIPE FURNACE. For Capsules or Crucibles ¾-inch diameter.—For illuminating gas only. This little furnace is made of Fletcher's non-conducting fire clay.

Two forms of furnace support are made, to be used in connection with the No. 5 Blast Bunsen. The Fletcher support is made of one casting, with a thin metal plate for the furnace to rest upon. The Lewis support is placed on a substantial tripod, and so arranged that the furnace is self-centering. The top plate on which the furnace rests can be turned aside, without detaching it from the burner, when it is desired to use the burner for other purposes. The cap of the burner is also secured to the frame by a wire hinge, which prevents it being lost or misplaced.

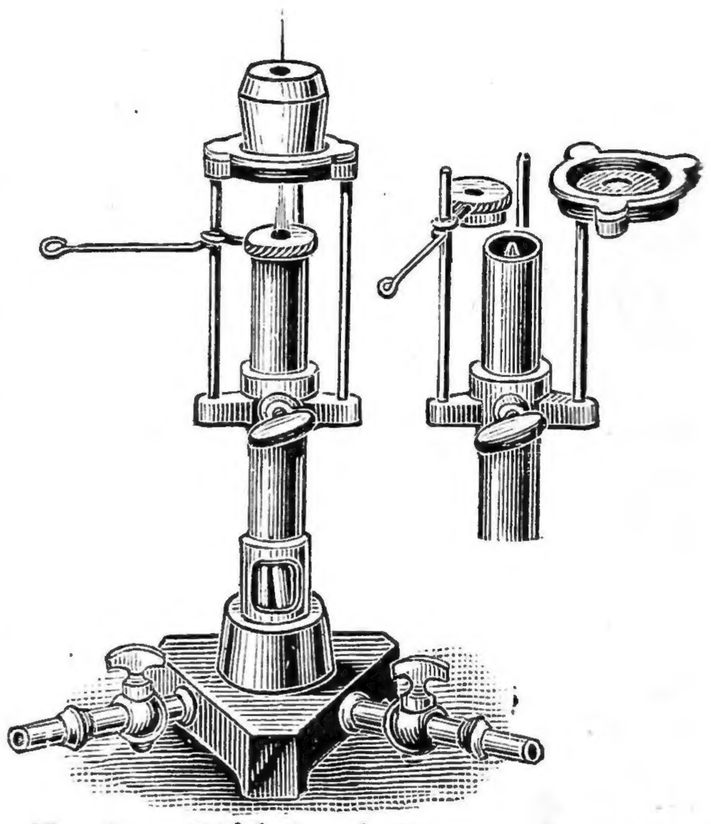
When used in connection with the blast Bunsen, the furnace has a hole in the bottom; it is also supplied with a side hole for use with a mouth blowpipe. With the blast Bunsen No. 5, as shown in the cut, and a Fletcher foot-blower, metals can be perfectly and quickly fused; the temperature being, at the same time, under the most perfect control. In ordering, specify "bottom" or "side" hole.



No. 5c. With Fletcher Furnace Support

PRICES:

No. 5c.	Blowpipe Furnace, with Blast Bunsen and Fletcher Furnace Support, . .	$4.25
No. 5e.	Blowpipe Furnace, with Blast Bunsen and Lewis Furnace Support, . . .	4.75
No. 5.	Blast Bunsen, alone, ...	3.50
No. 5d.	Blowpipe Furnace, alone, with bottom or side hole, and one Crucible, . .	.25
	Fletcher Furnace Support, alone, ...	.60
	Lewis Furnace Support, alone, including cap, .	1.00
	Clay Crucibles, per doz., ...	.25
	Clay Capsules, per doz., ...	.25

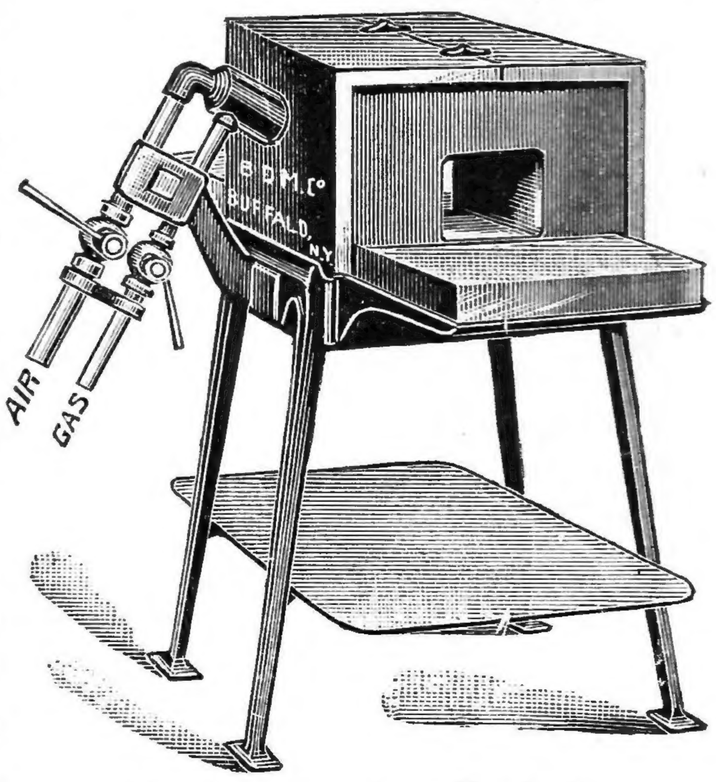


No. 5e. With Lewis Furnace Support.

Nos. 19 AND 19A CYCLONE TOOL FORGES. For general workshop and tool-room purposes.—This forge is indispensable to the tool-room, and a very convenient adjunct to the workshop. Its usefulness extends to all operations of heating and hardening lathe tools, end mills, milling cutters, dies, case-hardening, etc., with greater facility and perfection than with an ordinary forge. It is always available and ready for use from the time the gas is lighted. It is compact and sufficiently powerful to heat an iron or steel bar one inch in diameter, and yet can be controlled to heat and temper the smallest piece without injury.

This tool forge consists of an iron-bound fire-brick casing with an opening through it which contains an annular chamber, giving the flame a reverberatory action.

It rests upon a cast-iron frame twelve inches high. The framework also supports the Blowpipe and two fire-brick hearths on either end of the forge. By having the hearth on both ends, two men can work at the Forge at the same time.

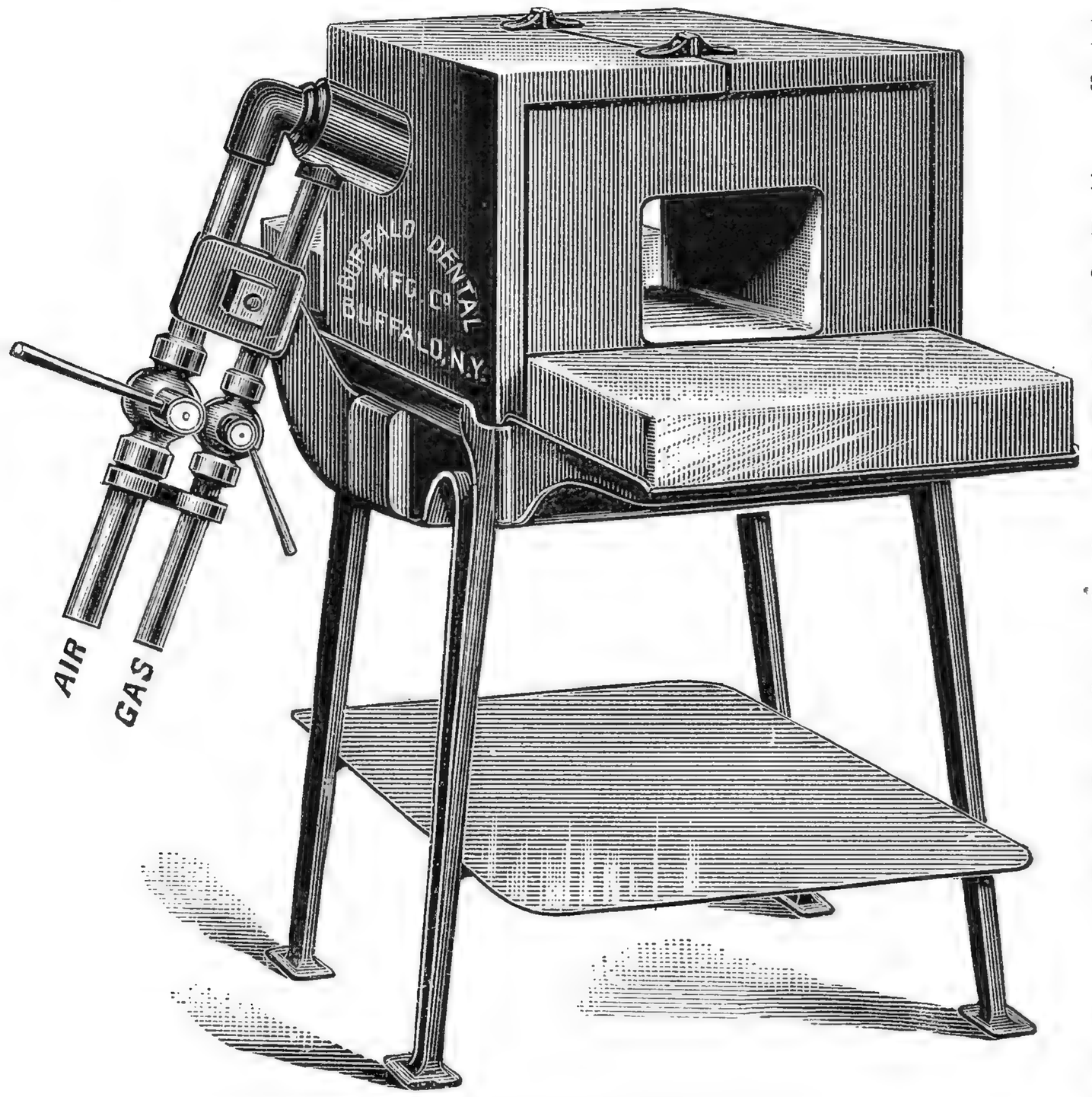


No. 19. Opening 3″x2½″

Underneath the forge is a heavy sheet-iron shelf for tongs or other tools.

The Cyclone Burner or Blowpipe that operates this Forge differs from any we have heretofore manufactured. It is simple, effective, and practically indestructible, and free from the local cutting action of the ordinary Blowpipe or Blast Burner. The combustion is absolutely perfect and instantaneous. Both air and gas passages are controlled by cocks, thus enabling the operator to produce any intensity of heat desired.

This Forge should be connected with a power-blower for large tool-rooms, but it can be operated successfully with Fletcher's No. 10B Blower; in fact, the blowpipe takes, in comparison to others, a very small quantity of air for its operation.



No. 19A. Opening 6″ x 5″

The Cyclone Tool Forge is supplied in two sizes:

No. 19, with casing nine inches long, seven inches wide and six inches high, and an opening through it three by two and one-half inches. Height over all, 18 inches.

No. 19A, with casing nine inches long, ten and one-half inches wide, by nine inches high, and an opening through it six inches wide by five inches high, to accommodate large dies and cutters. Height over all, 21 inches.

The Forge can be arranged to operate with natural gas, and will be so supplied on order.

It will be fitted for use with gasoline gas at same price as natural gas, the natural gas burner answering for either gas.

No. 44 Gasoline Gas Generator is recommended where a piped supply of gasoline gas is not available.

PRICES:

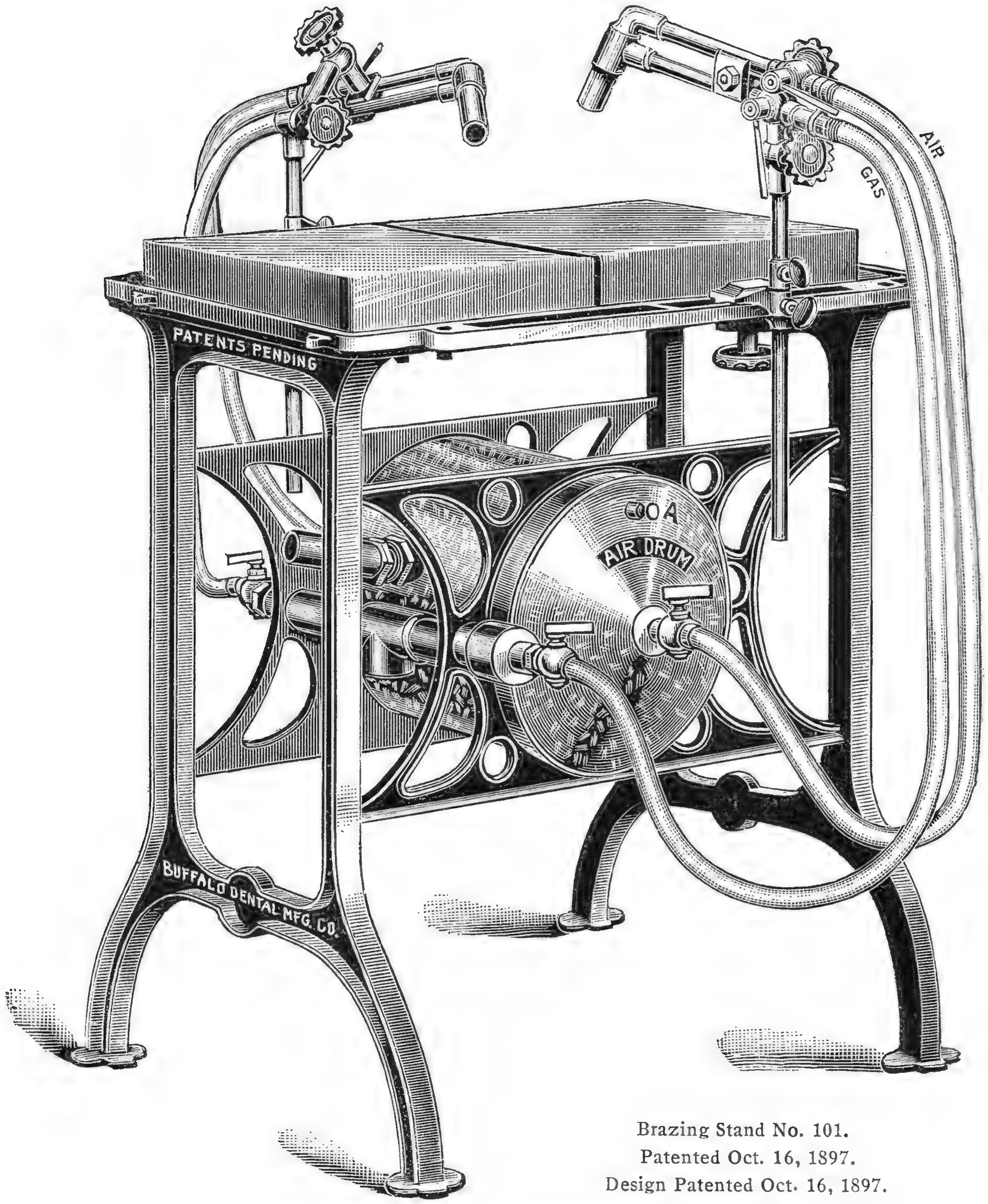
No. 19.	Cyclone Forge, small size, illuminating gas,	$10.00
No. 19.	Cyclone Forge, small size, for natural gas or gasoline gas,	12.00
No. 19A.	Cyclone Forge, large size, illuminating gas,	16.00
No. 19A.	Cyclone Forge, large size, for natural gas or gasoline gas,	18.00
No. ¼.	Root's Blower,	20.00
No. 1.	Crowell Blower,	20.00
No. 10B.	Foot-Blower,	12.50
No. 44.	Gasoline Gas Generator,	15.00
No. 19.	Body alone,	5.50
No. 19A.	Body alone,	9.50
No. 19.	Hearth alone,	.75
No. 19A.	Hearth alone,	.90

Nos. 19 and 19A always arranged for illuminating gas unless otherwise specified.

BRAZING STAND

FOR

AUTOMOBILE AND BICYCLE MANUFACTURERS, REPAIR SHOPS AND TOOL-ROOM PURPOSES.



Brazing Stand No. 101.
Patented Oct. 16, 1897.
Design Patented Oct. 16, 1897.

DIMENSIONS:

Size of Brazing Table,	20 x 30 inches
Height of Table,	31 inches
Weight, as shown above, less fire brick,	127 lbs.
Size of Air Drum,	17 x 12 inches
Size of gas pipe connection,	1¼ inches
Size of air pipe connection,	1¼ inches

B. D. M. CO.'S BRAZING STAND, NOS. 101 & 102. This brazing stand has many advantages over any apparatus yet designed, in points of convenience and adaptability of the blowpipes to all possible positions and to a great variety of work.

The frame is of cast-iron; strongly locked and bolted to secure rigidity. The table is of heavy sheet steel, firmly ribbed with one-inch T iron, supported by a cast-iron frame, and is removable. The table is of sufficient strength to hold any structure of fire brick for retaining the heat.

The frame around the table is slotted on both sides to allow the sliding block or bracket that supports the blowpipes to be moved in any direction horizontally on both sides of the table. Work can, therefore, be brazed on either end, or in the middle of the table, or both blowpipes can be placed on one side of the table, as desired. This feature is found in no other brazing stand.

The blowpipes used on this table are the No. 8F. These blowpipes are clamped to a swivel head, which is capable of being placed in any position. Each movement of the swivel head is independent, and is controlled by hand wheels. The adjustment for height is made by the sliding rods on the side of the table.

Beneath the table, and held in position by the cross braces, is the air drum, of heavy galvanized iron, with swelled heads. This drum has a brass solder union of 1¼-inch diameter for the attachment of a pipe from a power-blower. It also has two ½-inch clear bore air cocks—one on each end—to which the rubber tubing is attached.

An air pressure relief valve A (see illustration) is attached to the air drum by which the pressure of air is regulated when one or two blowpipes are in use. The valve is controlled by a milled plunger, which compresses or relieves a spring that rests on it. This is an important feature, as when using one blowpipe the valve should be opened to relieve the pressure of air, thereby increasing the effectiveness of the blowpipe. Too much blast is a detriment to perfect brazing.

By the side of the air drum is a 1¼-inch gas tee, extended to the outside of the braces, and terminated by two ½-inch clear bore gas taps. This tee can be shifted to either side of the air drum for convenience of attachment to gas supply pipe.

The rubber tubing for connections to blowpipes is especially made for us, and is the best quality, with extra thick walls.

The power-blower recommended for use in connection with this brazing stand is the No. ¼ Root's—which is amply powerful for two brazing stands. These brazing stands cannot be properly operated by means of a foot-blower, but require a positive pressure power-blower delivering air at a pressure of 1 to 1½ pounds per square inch.

The brazing stand is shown with two fire brick, 15 x 14 x 2 inches, which are extras, and not sent with the stand unless specially ordered.

If desired for use with natural gas, No. 8G Blowpipe will be substituted without advance in price.

PRICES;

No. 101.	Brazing stand complete with two Blowpipes and Rubber Tubing, without Power-Blower, ...	$35.00
No. 102.	Brazing stand with one Blowpipe and Rubber Tubing, without Power-Blower, ...	30.00
	Root's No. ¼ Power-Blower, extra, ...	20.00
	Fire Brick, extra, 15 x 14 x 2 inches, each, ...	.75

NOTICE.—The 8F Blowpipe used on our brazing stand is the one so universally used by bicycle manufacturers and repairers. These Blowpipes are made on correct principles to ensure power, efficiency, and economy, and have never been equaled. The B. D. M. Co. are the original manufacturers of this pattern of blowpipe, and its popularity has caused it to be imitated as far as outward appearance is concerned. From actual trials these imitations have been found deficient in power and effectiveness, owing to faulty construction and disproportionate parts. It is, therefore, important to brazers, if they desire an effective blowpipe, to observe that "Buffalo Dental Mfg. Co." is stamped on the blowpipe tubes.

INSTRUCTIONS FOR SETTING UP THE B. D. M. CO.'S BRAZING STAND. This Brazing Stand, as sent out, is complete, with the exception of the two fire brick, 15 x 14 x 2 inches, as shown in the illustration.

The supporting uprights and their necessary joints, two blowpipes, and rubber tubing, will be found in separate package secured under the table. The necessary connections for gas, and solder unions on Air Drum, are all in position.

After placing the stand in the position desired, connect up the gas tee with the main in the shop or factory. If possible, the gas supply pipe should not be reduced from the size of the tee. Although the quantity of gas used is very much smaller than the opening in the tee, it is always well to have sufficient pressure of gas immediately at the point where it is used, and not restricted in any way by conveying through a small pipe.

In connecting the Power-Blower with the Air Drum, pipe of the full size opening of the Blower should be used. The size of this pipe also should not be restricted or reduced, as it will require a higher speed to produce the same amount of blast through a small pipe. A pipe made of tin is preferable.

Now secure the uprights to the sides of the table in the position desired, and clamp the blowpipes in their proper place.

The Blowpipe heads are marked "Gas," and "Air," and care should be taken that the tubing is placed on the Blowpipes from the *air* pipe to the *air* drum, and from the *gas* pipe to the *gas* cock on the gas pipe. A reversal of these connections will not produce satisfactory results; in fact, the utmost care should be taken to have the connections rightly made.

GASOLINE GAS FURNACES.

Nos. 41 & 41A. FURNACES WITH No. 44 FLETCHER'S GASOLINE GAS GENERATOR. The well-known Injector Gas Furnace, which in power, simplicity and convenience has not been approached by any known furnace, is also supplied with a simple and safe arrangement for burning the light vapor of gasoline, the No. 44 Gasoline Gas Generator giving a power and efficiency fully equal to that which can be obtained by a large gas supply. The arrangement is in every way as simple as when gas is used, requiring no more trouble or attention.

It not only equals a gas furnace in every respect, and can be used where gas is not available, but, in addition, it gives a flame and heat of absolute purity, fitting it for the most delicate chemical operations where gas cannot be used, owing to the presence of sulphur and other impurities.

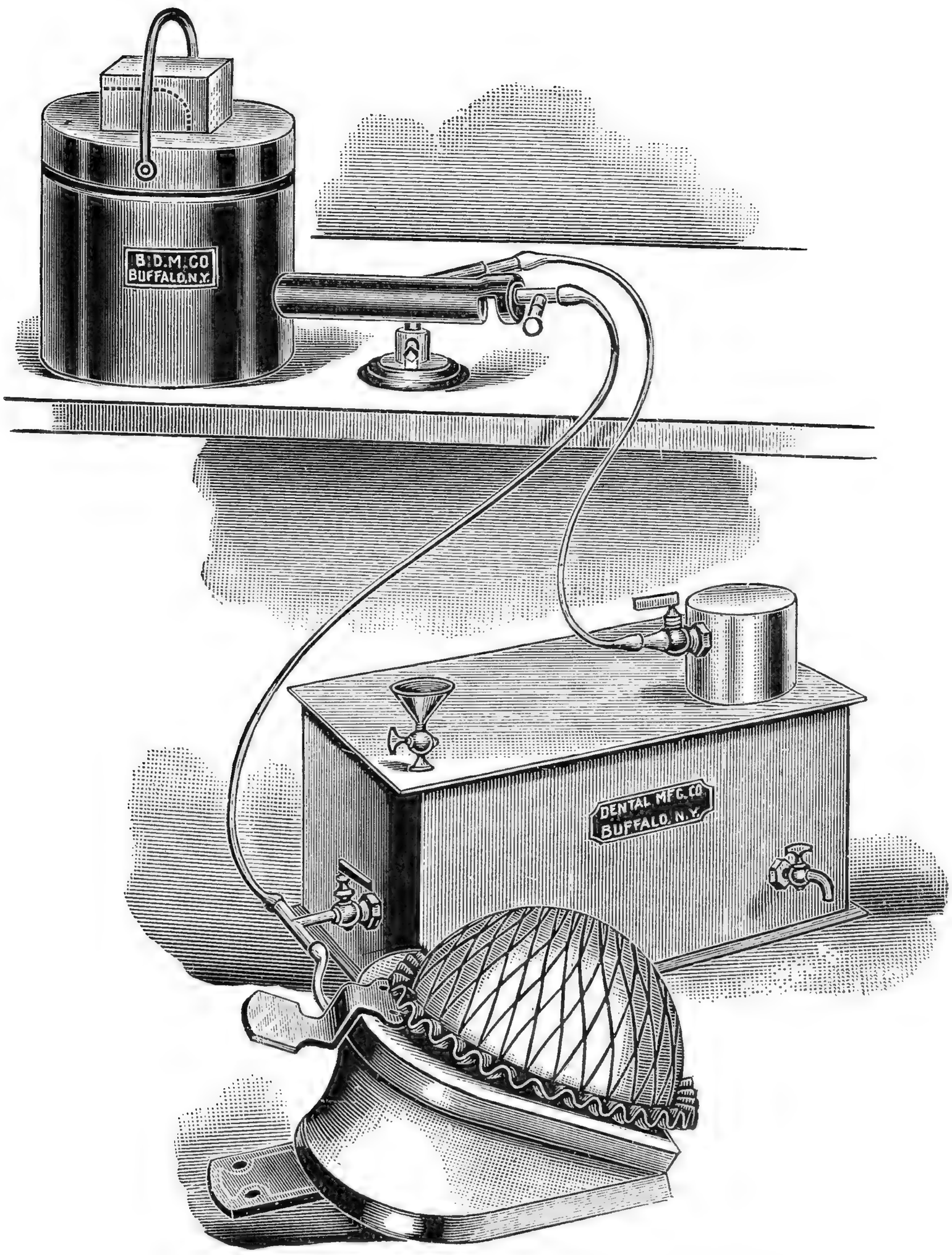
The ordinary pattern of injector furnace is used in precisely the same way as with gas, the only difference being that rubber connecting tubing is carried to the tee on the generator, and a rubber tube is carried from the upper tap to the side tube of the injector burner marked "gas."

The quantity of vapor required is adjusted by the lower tap when the furnace is working, and the flame must be just visible at the hole in the lid, exactly as when gas is used, the instructions being precisely the same for both fuels.

This arrangement is strongly recommended, not as a makeshift, but as *at least* equal in power and convenience to the best gas furnace constructed.

The engraving shows the 6-lb. size Furnace, Generator and Foot-Blower, as when in use. Size of Generator, 10 x 10 x 18 inches. Capacity, about 1½ gallons of gasoline.

The Foot-Blower supplied with the No. 41 Furnace is No. 9A. With the No. 41A Furnace, No. 9B Foot-Blower is furnished.



No. 41A Furnace, No. 9B Blower and No 44 Generator.

PRICES:

No. 44. Gasoline Gas Generator, alone, ... $15.00

No. 41. (2 lb.) Furnace, No. 9A Foot-Blower, No. 44 Generator, No. 1 Clay Crucible and Tubing, complete, for gasoline gas, 28.00

No. 41A. (6 lb.) Furnace, No. 9B Foot-Blower, No. 44 Generator, No. 3 Clay Crucible and Tubing, complete, for gasoline gas, 34.50

For full description of furnaces and dimensions of clay parts, see Gas Furnaces Requiring Blast.

NOTE:—The gasoline gas generator is useless except with a supply of air under pressure. It cannot be used with draft furnaces.

No. 40A. FURNACE WITH NO. 40C GASOLINE GAS GENERATOR. The Generator operates precisely like the No. 44, the same directions for use serving for both Generators. Capacity of Generator about one quart of gasoline. Size, 4 x 4 x 10 inches. The 74° gasoline, such as is used in vapor stoves, is the most suitable for use in this Generator. Lower grades do not give as good results.

Fluxes must be kept away from the furnace casing.

To those desiring a small furnace for *high temperatures*, where gas is not available, this one will be found particularly satisfactory.

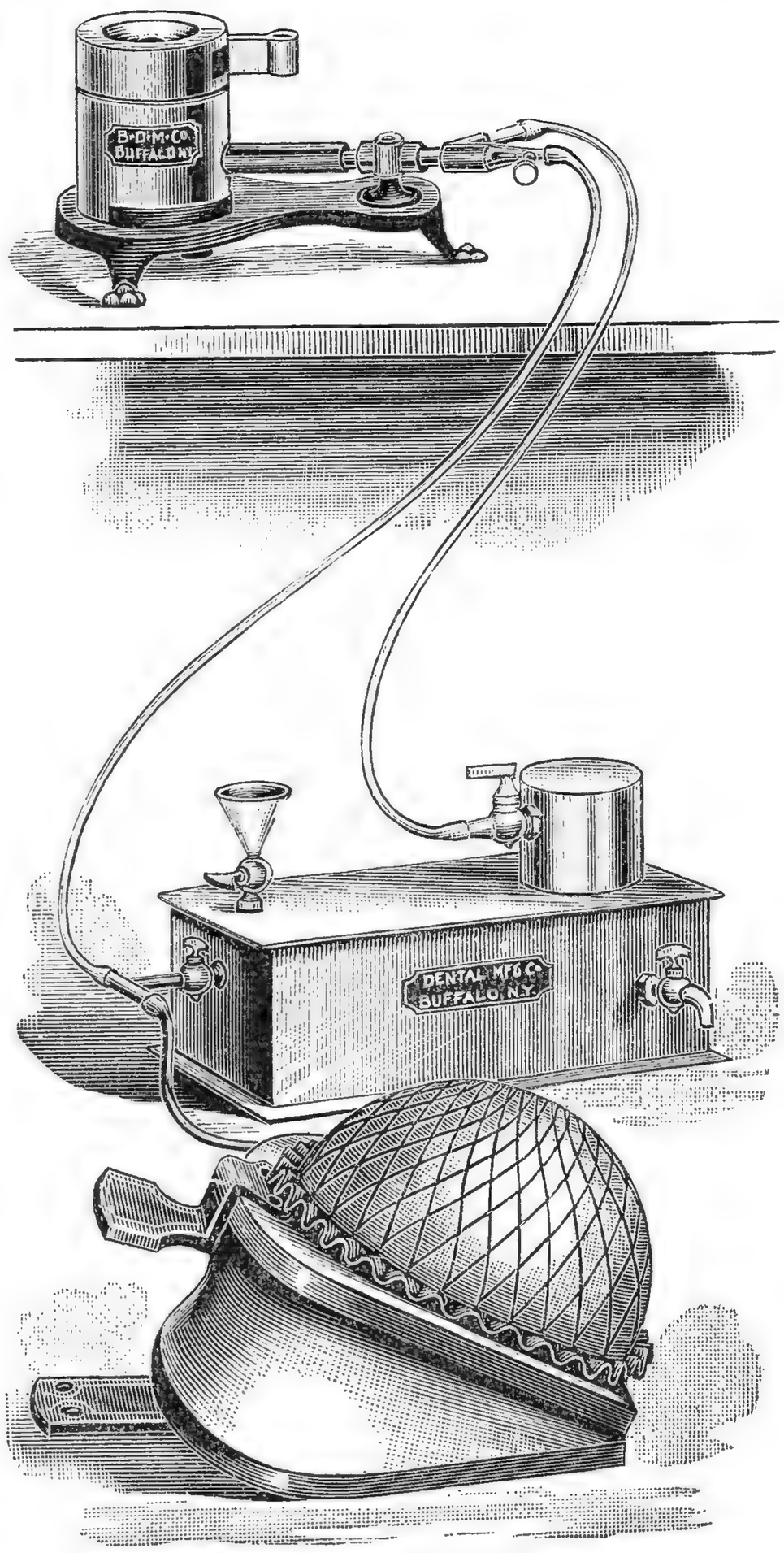
For full description of No. 40A Furnace, see Gas Furnaces Requiring Blast.

PRICES:

No. 40A Furnace, No. 40c Generator, No. 9A Foot-Blower, and tubing, complete for use, ... $18.00

Gasoline Gas Generator No. 40c, alone, ... 6.00

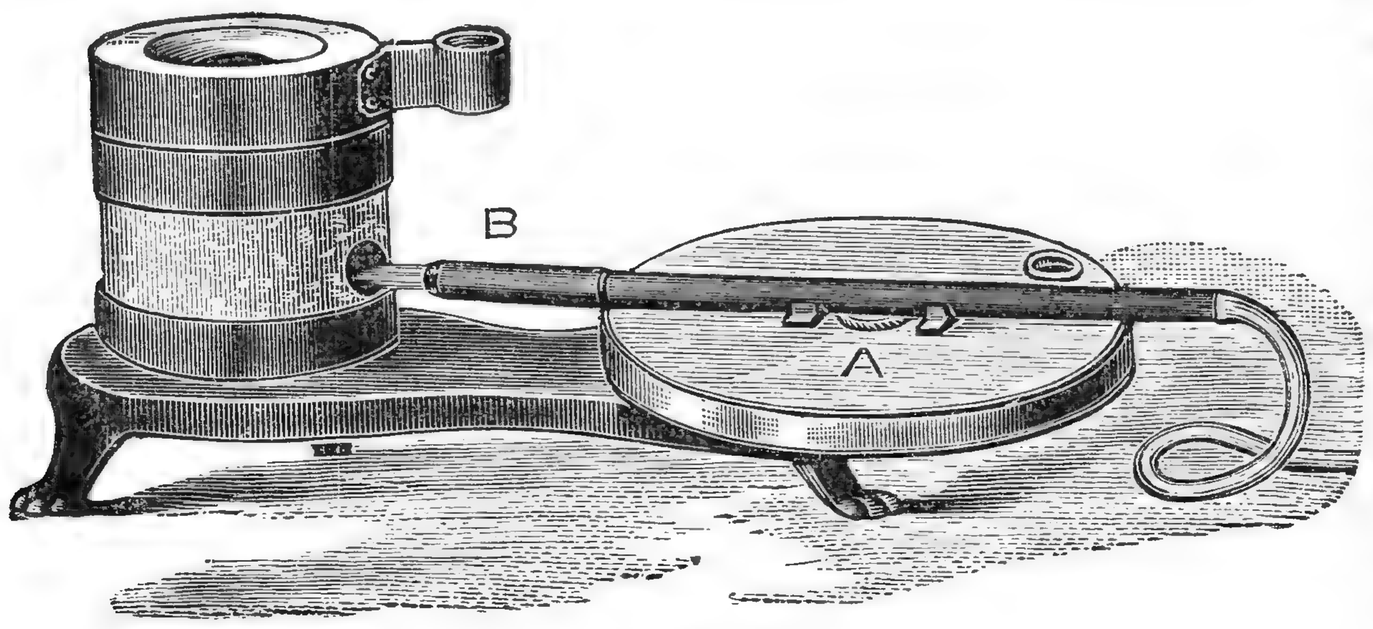
For prices of furnace parts, see No. 40.



No. 40A Furnace and 40c Generator.

KEROSENE BLAST FURNACES.

No. 40B. CRUCIBLE FURNACE FOR KEROSENE. The gas furnace No. 40 having proved itself so thoroughly efficient and satisfactory, a modified pattern has been designed, retaining all the peculiar advantages of the original, but burning refined petroleum or kerosene instead of gas for fuel; and we can confidently recommend it as being fully equal in efficiency to the gas furnace. The burner for this furnace is constructed upon the principle of an atomizer; this, of course, dispenses with a wick. Full directions for operating this furnace accompany it. Either the No. 9A or the No. 10A Foot-Blower must be used with this furnace. A thin layer of powdered quicklime on the bottom of the furnace will prevent the adhesion of the crucible to the casing. Keep all fluxes away from the furnace casing. No. 40B takes No. 00 Crucible.



No. 40B

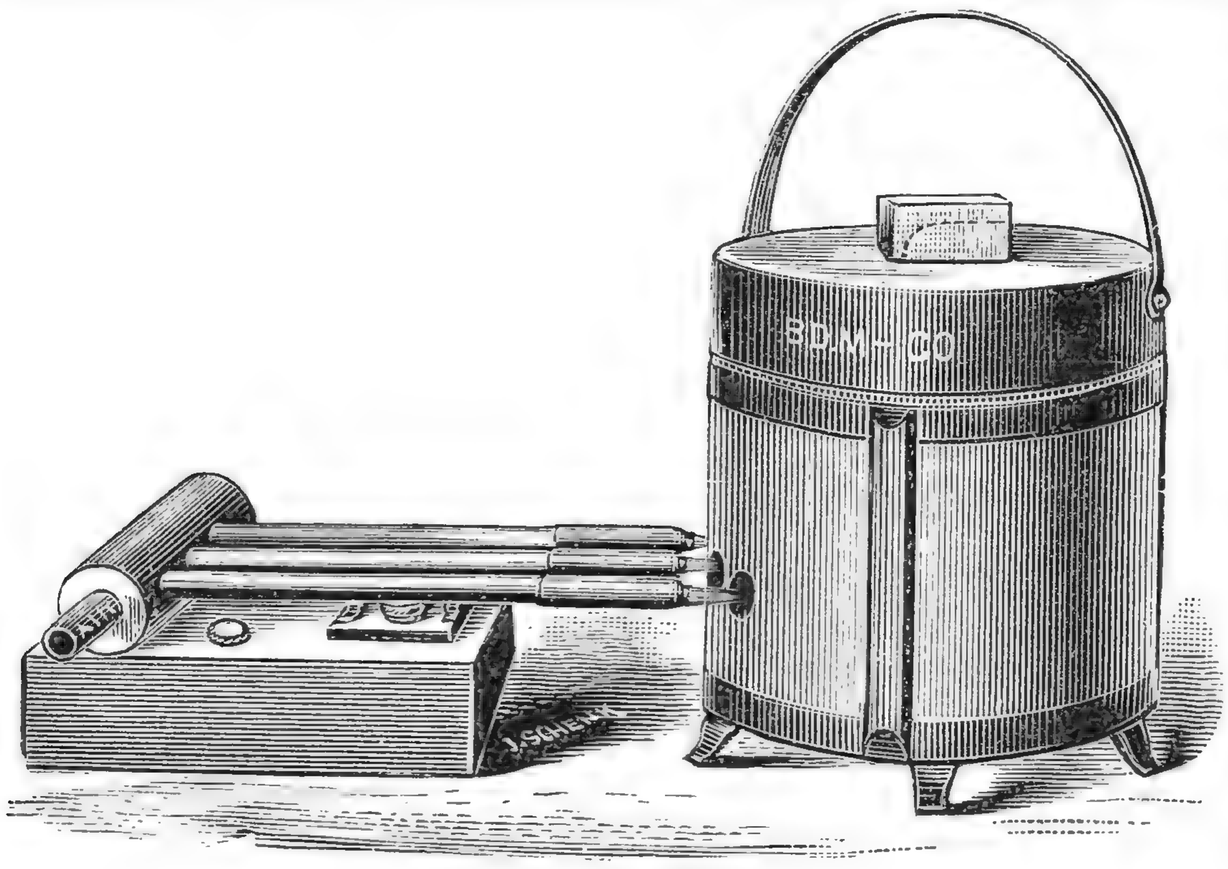
PRICES:

No. 40B. Crucible Furnace, with one No. 00 Clay Crucible, without Foot-Blower, ... $5.50

No. 40B. Kerosene Burner, separately, ... 3.00

For prices and dimensions of furnace parts, see No. 40.

No. 41E AND No. 41F PERFECTED INJECTOR FURNACES. For Kerosene.—The illustration shows the Perfected Injector Furnace fitted for the use of refined petroleum or kerosene as a fuel, by the adaptation to it of a number of burners, such as are used in the No. 40B Furnace. The arrangement is in every way as simple and effective as when gas is used, requiring no more trouble or attention. It has been fully tested in the performance of metallurgic operations, and has been found equal to the gas furnace in efficiency. The number of burners used varies with the size of the furnace, and a foot-blower of proportionate size will be required.



No. 41F.

The Fletcher Foot-Blowers must always be used with these furnaces, as they are so made that they will not clog the burner by picking up dirt from the floor. For No. 41E or No. 41F use No. 10B Foot-Blower.

Dimensions of clay parts, same as Nos. 41 and 41A.

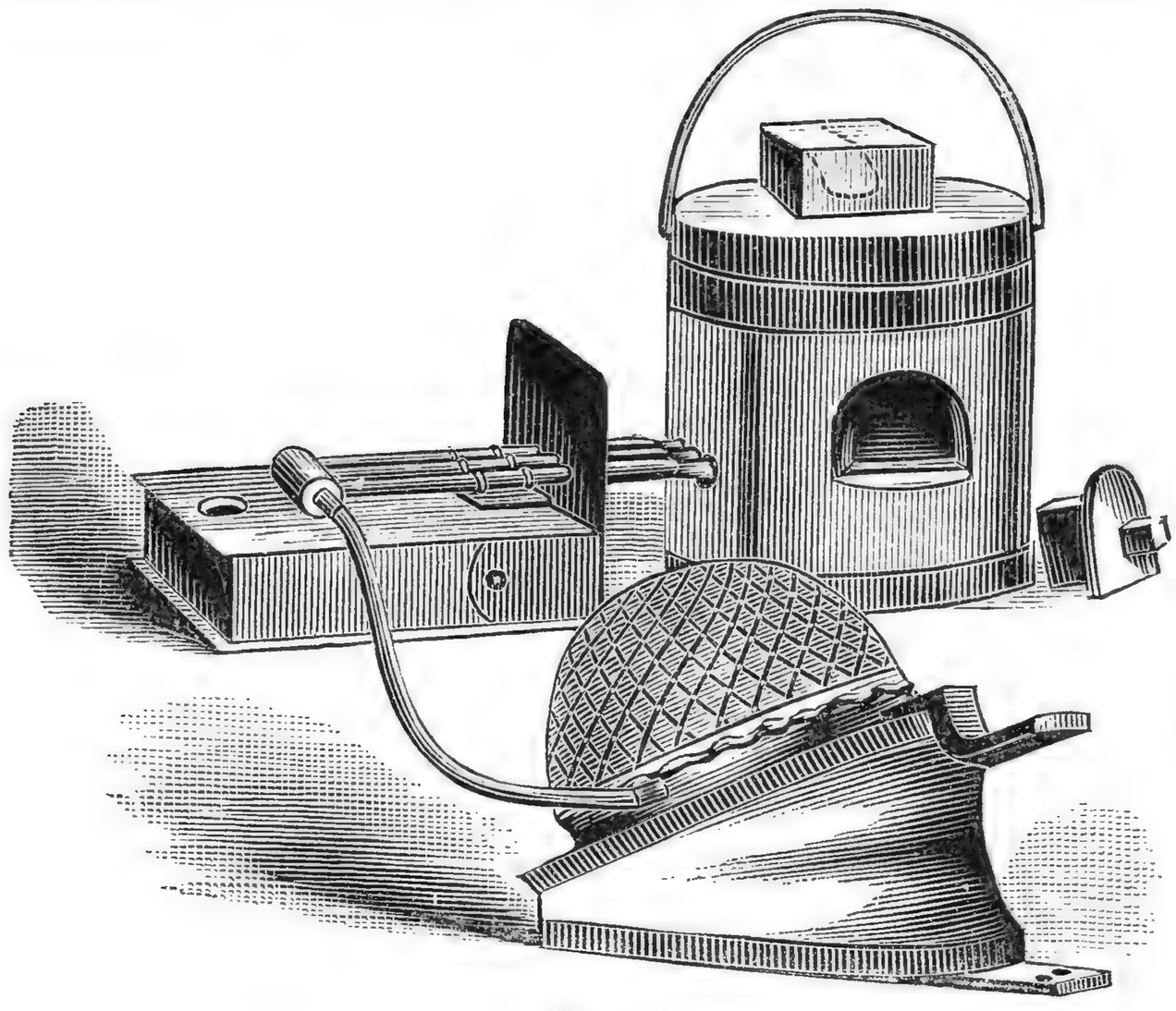
PRICES:

No. 41E (2 lb.) Crucible Furnace with No. 1 Clay Crucible, two burners, without Foot-Blower, ...	$10.50
No. 41F (6 lb.) Crucible Furnace with No. 3 Clay Crucible, three burners, without Foot-Blower, ...	13.00

PRICES FOR SEPARATE PARTS

No. 41E. Furnace Body, Cover and Dome only, ...	3.50
No. 41F. Furnace Body, Cover and Dome only, ...	5.00
Extra Crucible Support, No. 41E or No. 41F, each, ...	.15

No. 241 COMBINED CRUCIBLE AND MUFFLE FURNACE. For Kerosene Only.—The casing of this furnace is the same as No. 141, but with three burners using kerosene as fuel. It is supplied with muffle fittings, and can be used either as a crucible or muffle furnace. The cover projects in the cavity of the furnace nearly to the top of the muffle, there being room enough to accommodate a No. 3 Crucible, holding 6 lbs. of metal. By reversing the cover, a No. 6 Crucible, holding 12 lbs. of metal, may be used. The No. 9B or No. 10B Foot-Blower must be used with this furnace.



No. 241.

Inside furnace space, 6¼ in. diameter by 7 in. high. Dimensions of pot and cover outside, 9 in. diameter by 11 in. high.

PRICES:

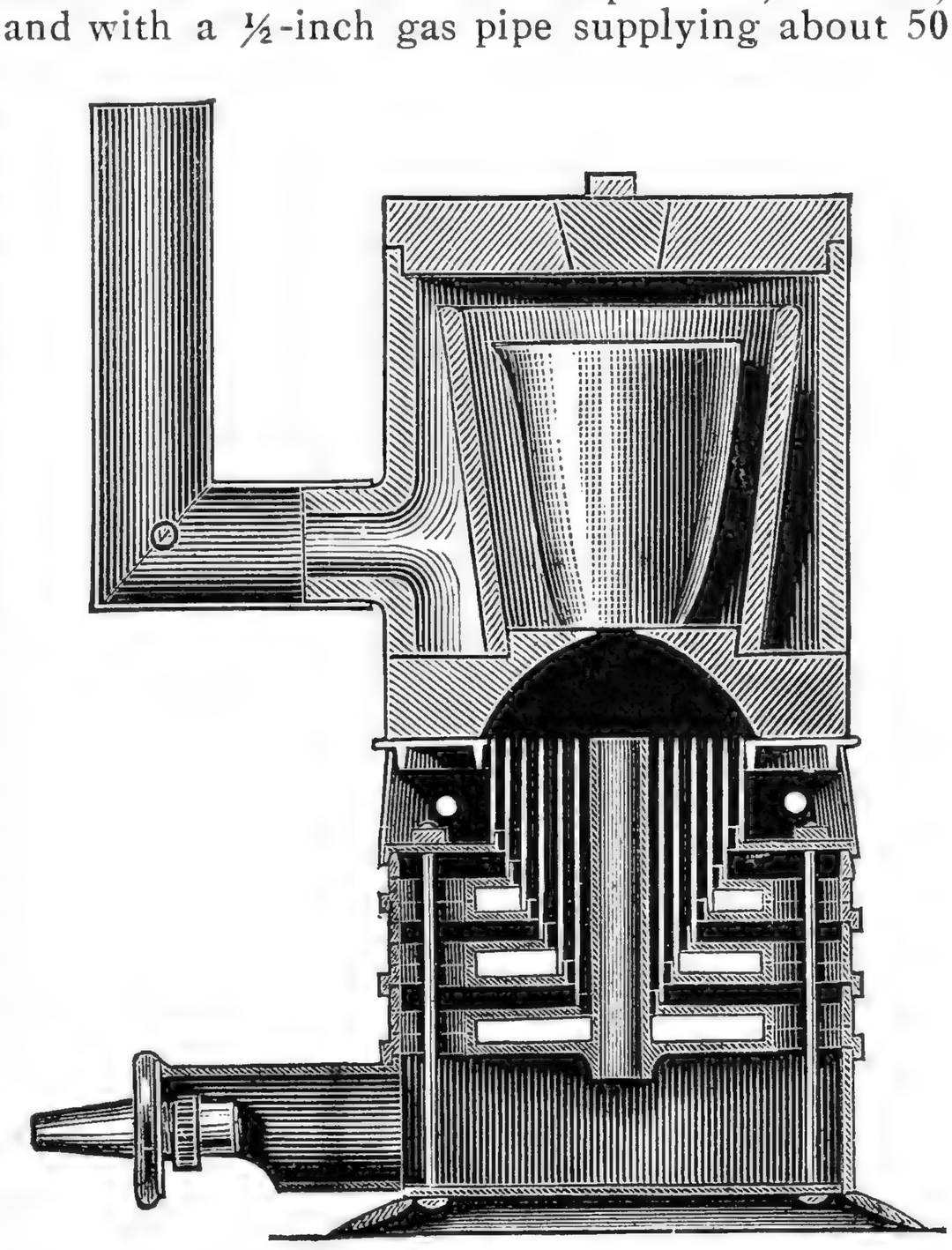
No. 241. Combined Crucible and Muffle Furnace, for Kerosene, with Muffle and No. 3 Clay Crucible without Foot-Blower .	$17.00
No. 241. Furnace Body, Cover, Dome and Plug only, ...	7.50
Extra Plumbago Muffles, 3 ½ x 2⅞ x 6¼ inches, ...	1.50

GAS FURNACES WITHOUT BLAST.

FLETCHER'S DRAFT FURNACES. FOR HIGH TEMPERATURES, requiring neither blast nor attention. Of these furnaces thousands are at present in use for chemical purposes, enamel burning, jewelers' and dentists' work, etc., and their use is being rapidly extended to all purposes where rapidity and certainty of results are required without trouble. These furnaces are made in three distinct types: one comprising the muffle furnaces, with a perforated dome over the muffle to attain the maximum heat; another, comprising the No. 15, with the side chimney and lid over the crucible, and another comprising the Nos. 63, 63A and 630, in which the crucible stands on a hearth, the flame striking it latterly and passing around it.

A chimney or stove pipe 8 to 10 feet high may be used as a fixture, and the draft partially stopped with a damper or slide when lower temperatures are required, the gas being turned down in proportion; the guide for the proper adjustment being that UNDER ALL CIRCUMSTANCES THE FLAME MUST JUST COVER THE CRUCIBLE OR MUFFLE, but not extend into the chimney so as to make it red hot. When the flame covers the crucible or muffle the gas is doing its extreme duty under the most favorable circumstances, without waste. *Plumbago fittings and crucibles must be heated slowly the first time they are used.* After the first time they may be subjected instantly to the full power of the furnace without injury. If the gas supply is deficient, the tap is generally at fault, and should be replaced with tap No. 114, and India rubber tubing, smooth inside, and without wire, should be used. If muffles are required with slits for assaying and oxidizing, slits may be easily cut in the back with a penknife before the muffle has been used. After it has been exposed to high temperature, the plumbago does not cut readily, and requires more care than if cut before.

No. 15 CRUCIBLE FURNACE. This will take crucibles up to 4x3½ inches, holding about six pounds when full, and with a ½-inch gas pipe supplying about 50 feet per hour, will rapidly melt a crucible of gold or silver. It is made in a very substantial manner, and is recommended as a first-rate furnace for manufacturing jewelers' use. The lid can be lifted away by a handle provided for the purpose. In using this pattern of furnace, the narrow end of the plumbago cylinder which surrounds the crucible is always put downward. The office of this cylinder is to keep the flame in contact with the crucible up to the top. The flame is then deflected by striking against the lid, and, turning downwards, leaves the furnace by the chimney at the side. The cap-nut, which will be found in the throat of the horizontal "mixing tube," where the air enters and mixes with the gas, is used for changing the size of the orifice from which the gas escapes. When the escape is from a large orifice, a smoky, yellow, or "reducing" flame is the result. The orifice can be contracted by revolving the cap-nut onto the gas delivery tube, when a blue or oxidizing flame may be obtained. Adjustment for the proper flame should first be made by this nut, and the size of the flame regulated afterwards by means of the cock at the gas main. A slightly yellow flame gives the best results when a high heat is desired. The cap-nut above described is clearly shown at the left-hand lower corner of the sectional illustration.



No. 15.

DESCRIPTION OF BURNER. These furnaces are supplied with an improved pattern of burner,which gives a number of concentric circular flames, as does the multiple Argand burner used in large lighthouses, and shown in the illustration of No. 15 Furnace.

The gas enters the chamber at the bottom of the burner through a device similar to a Bunsen burner, mixing with air as it enters, and is burned at the upper end of a series of concentric tubes, furnishing air-spaces alternately with those supplying the mixture of gas and air. The whole burner is constructed of iron, and will be found to withstand an intense heat. In case metal should be spilled into the burner, it can easily be taken apart for its removal.

Each part of the burner is lettered, and in case of accident, it can be supplied at a small expense by specifying the letter on the piece desired.

To take the burner apart, remove the top plate, then unscrew the three bolts, after which the parts of the burner can be easily separated, In putting the burner together, care should be taken to get the circular openings through which the bolts pass fair with each other, as they serve to conduct the gas from one section to the other. The rings of wire gauze must be adjusted so as to be concentric with the burner, or an explosion will ensue when the gas is turned of. Flame space in furnace, 6¼ in. diameter; 5½ in. high. Outside dimensions of clay parts 7½ in. diameter by 10 in. high. Height of furnace from table to top of lid, 18 inches.

PRICES:

No. 15. Crucible Furnace, 6 feet of pipe, No. 3 Clay Crucible, Clay Cylinder and Tongs, complete,	$16.00	Clay Cylinders, No. 15,	$ .50
Plumbago Crucibles, No. 3, each,	.30	Fire-clay Casing,	3.00
Plumbago Cylinders, No. 15,	1.00	Lid,	1.50
Clay Crucibles, No. 3,	.20	Grate,	1.00
		No. 15, Burner,	9.00
		Wire Gauze Rings, each,	.25

No. 15 Furnace may be operated with illuminating gas, natural gas or gasoline gas without alteration.

No. 15 Furnace. Scorification and Cupellation.

BUFFALO DENTAL MFG. CO.

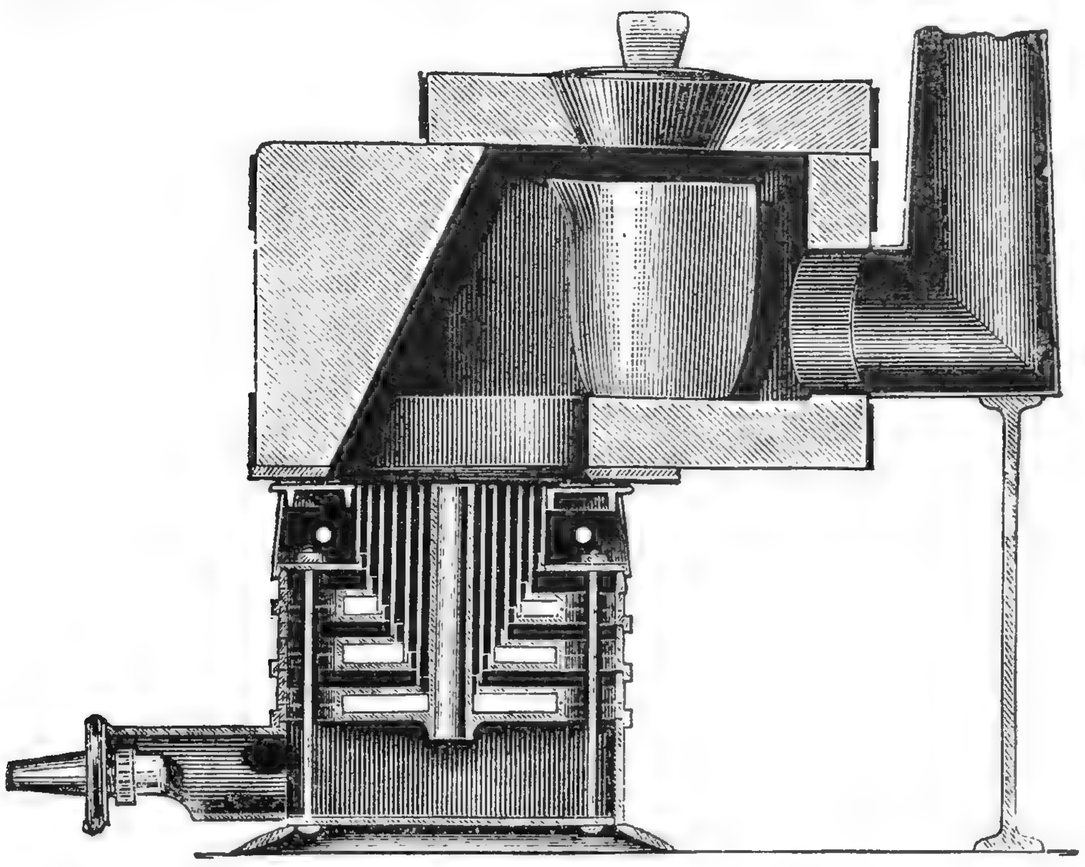
Gentlemen: Perhaps it may be of interest to you to know that your No. 15 Crucible Furnace can be used satisfactorily for scorification and cupellation as well as being an ideal furnace for crucible fusion. My method is as follows:

Place a cylinder of refractory material, or an inverted crucible of about 3 or 3½ inches height upon the grate and place scorifier or cupel on top (I use a No. 1 graphite crucible 2½ inches diameter by 3 inches high). Get up heat as usual and regulate gas and air for an oxidizing flame—be sure to have plenty of draught. When hot remove fire-clay plug from hole in cover, and cover the opening with two pieces of mica about 2 x 4 inches; butt the edges together in a line across the center of the round hole. I think it best to have the joint on a line with the chimney pipe, but it does not make much difference. The scorifier, or cupel can be used very nicely now, and may be controlled very readily. To admit air for the operation, separate the edges of the mica slips slightly—say about ⅛ or ¼ inch at one end. The powerful draft of the chimney—in my case only 6 feet long—will draw down a current of air directly into the scorifier, and the action can be regulated by separating the mica slips more or less widely. I have in making a rescorification reduced a 62 gramme button to 27 grammes in 25 minutes, starting with a cold furnace, using a 3-inch scorifier. In cupelling, I finished the 27 gramme button in a 1½-inch cupel in another 25 minute's run. The only difficulty in cupelling is to keep the heat low enough; but by carefully regulating, it can be managed, and a plentiful supply of air from the slit between the mica strips helps to keep down the temperature as well as hastening the operation.

Now all this may be very old and well known, but I do not find it in your catalogue, nor have I ever seen it mentioned; but anyone trying it will be pleased with the results, and it is another addition to the many good points of the Furnace. Of course I do not claim that this method is equal to a regular Muffle Furnace; or to the Monitor Furnace, but where there is a lack of room—or cash—for a second furnace and a desire to make an occasional scorification or cupellation, it answers the purpose admirably, and surely it has an advantage for such workers in the fact that it is the only gas furnace, so far as I know of, working without air blast, which will perform successfully the three operations of Crucible Fusion, Scorification and Cupellation. Another point; by using the mica to cover the hole in furnace cover in other operations considerable knowledge can be gained of the workings of this Furnace. The distribution of flame and heat is interesting and worth looking at.

E. P. CLARK.

No. 63 DIRECT DRAFT CRUCIBLE FURNACE. This form of furnace is more simple than the No. 15. It is powerful enough to melt gold or silver, but slower than the No. 15. It can be used for scorifying and cupelling. The lid can be pushed sideways sufficiently to give access to the interior of the furnace. There are two sizes of this furnace: No. 63, for No. 1 Crucibles; No. 63A, for No. 3 Crucibles. No. 63 clay parts are 10¾ in. long by 7½ in. wide by 6⅝ in. high outside and the flame space measures 3 in. diameter by 3 in. deep. No. 63A clay parts measure 12½ in. long by 8½ in. wide by 7½ in. high, and flame space is 4½ in. diameter by 4 in. deep. No. 63 stands 15 in. high and No. 63A 15½ in. high, from table to top of lid.



No. 63.

This furnace is the one recommended by Walter Lee Brown, of Chicago, for roasting ores.

The burner used is constructed on the same principle as the No. 15.

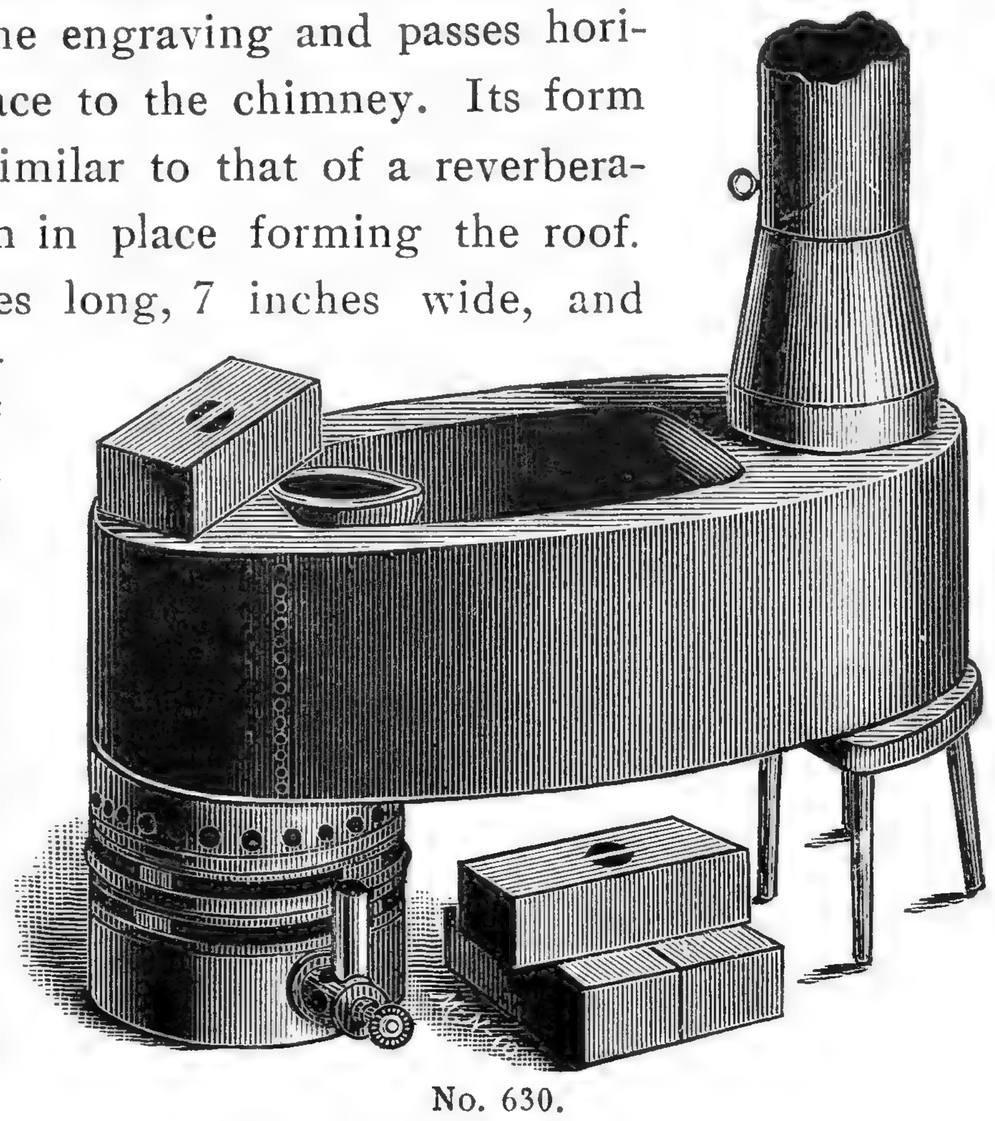
Prices include one length of pipe, damper and crucible. Tongs are also furnished with this furnace. Gas supply pipe required for No. 63, ⅜-in. for No. 63A, ½-inch.

PRICES:

No. 63, with No. 1 Clay Crucible, ... $16.00
No. 63A, with No. 3 Clay Crucible, ... 18.00

No. 16 Burner is supplied with No. 63 Furnace; No. 15 Burner is supplied with No. 63A Furnace. Nos. 63 and 63A Furnaces may be operated with natural gas, illuminating gas, or gasoline gas without alteration.

No. 630 MONITOR FURNACE. An improved form of Gas Assaying Furnace, suggested by Walter Lee Brown, Chicago, Ill.—In this furnace the flame arises from the burner, shown at the left of the engraving and passes horizontally through the body of the furnace to the chimney. Its form and mode of operation are somewhat similar to that of a reverberatory furnace, the movable bricks when in place forming the roof. The exterior dimensions are 20 inches long, 7 inches wide, and 5½ inches deep, exclusive of cover bricks. Height from table to top of cover, 15¾ inches. It will accommodate four 2¾-inch scorifiers, or eight to ten cupels, at once. The size of the floor is 10 x 3⅞ inches, and the cavity is 3⅝ inches deep, accommodating a No. 1 Plumbago or Clay Crucible. As there is no direct heat *under* the floor of the furnace, a platform is furnished, on which scorifiers and cupels are placed. The heat passing under as well as over the platform, the articles placed thereon are heated quickly and evenly.



No. 630.

The gas supply should come through a ½-inch pipe from a tap at least ⅜-inch clear bore, so that the gas will be delivered at full pressure. Proper connection should be made by means of small stove-pipe from the furnace to a chimney.

The advantages in this furnace, are that it is possible to see every step and stage of the operation, and there is such perfect control of the heat, that a higher or lower temperature, a reducing or oxidizing effect may be produced at any time as may be desired. It is noiseless. It is free from the annoyances of dust and ashes and excessive heat in the room, and is especially desirable for summer use. Gas consumption, 30 feet per hour.

PRICES:

No. 630. Monitor Furnace, . .	$18.00	Supports for Platform, each,	$0.05
Fire-Clay Slabs for covers, each,	.50	Tripod, ...	.50
Body of Furnace, ...	8.50	No. 16 Burner, ...	9.00
Platform, ...	.15	Chimney Pipe, per length, .	.35

One length of chimney pipe, with damper, No 1 clay crucible and tongs, are included in price of furnace. No. 16 Burner is supplied with No. 630 Furnace.

No. 630 Monitor furnace may be operated with illuminating gas, natural gas or gasoline gas without alteration.

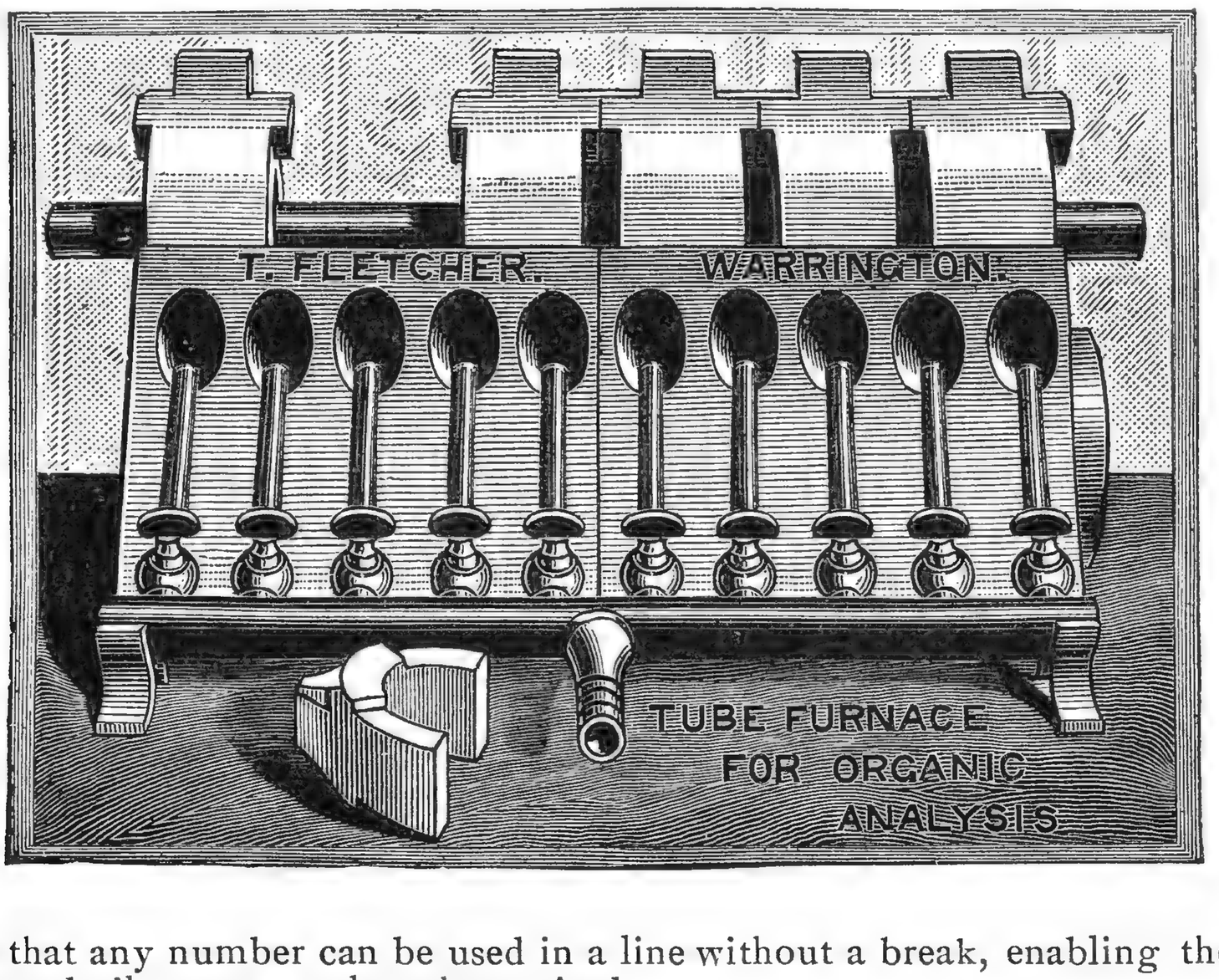
No. 170. FLETCHER'S TUBE FURNACE. For illuminating gas only. The special points about this furnace in which it differs from others, are, the burners are outside and in front of the furnace and clear from all falling dirt. There is no ironwork to rust, brass being the only metal used in its construction.

The furnace body is in 6-inch sections, and can be made up to any length without any obstruction, such as occurs when a long Hoffman furnace is used with a short tube.

The burners can be made any length, and any part of them used; the blocks and covers are sold separately, and the burners can be supplied in sections of 12 or 24 inches, so that any number can be used in a line without a break, enabling the furnace to be at once built up to any length required.

If a fixed length is required, any number of sections can be secured permanently together.

In use it is free from smell. For illuminating gas only.



PRICES:

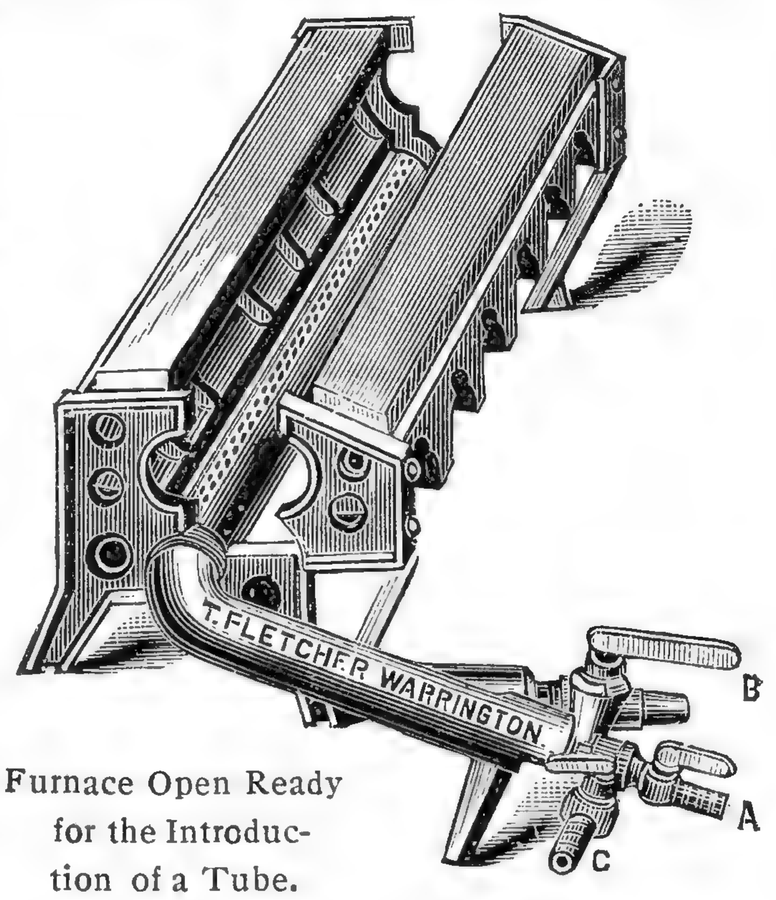
No. 170. Tube Furnace, 12 inches,	$26.00	Extra Cover Blocks, each, . . .	$0.50
No. 170A. Tube Furnace, 24 inches,	50.00	Extra 6-inch Sections of Body, each,	4.75

No. 17. FLETCHER'S TUBE FURNACE. This will heat an iron tube, ¾ to 1 inch diameter, to its softening point in ten minutes, using a No. 10A Foot-Blower; or it will heat the same tube to redness without a blast, the burner being applicable for either draft or blast.

To use without the foot-blower, close taps B and C and attach the gas tubing to A. Open the tap and regulate the flame by turning the milled nut in the throat of the cast-iron tube where the tap A is screwed on. To make the length of flame adjustable, the flame tube is provided with a sectional cover, any or all parts of which may be turned to close the gas openings. By this means a flame may be produced at any part of the tube independently of other parts; and the adaptability of a number of separate burners is secured at a comparatively small expense.

As a Blast Furnace, connect B to a second gas supply, full ½-inch bore, and connect C to a foot-blower. When the blast is applied, the tap A must be closed and the gas supplied only from B.

The above can be used with natural gas, gasoline gas or coal gas without alteration. Foot-Blower No. 10A or a power blower must be used with this furnace.



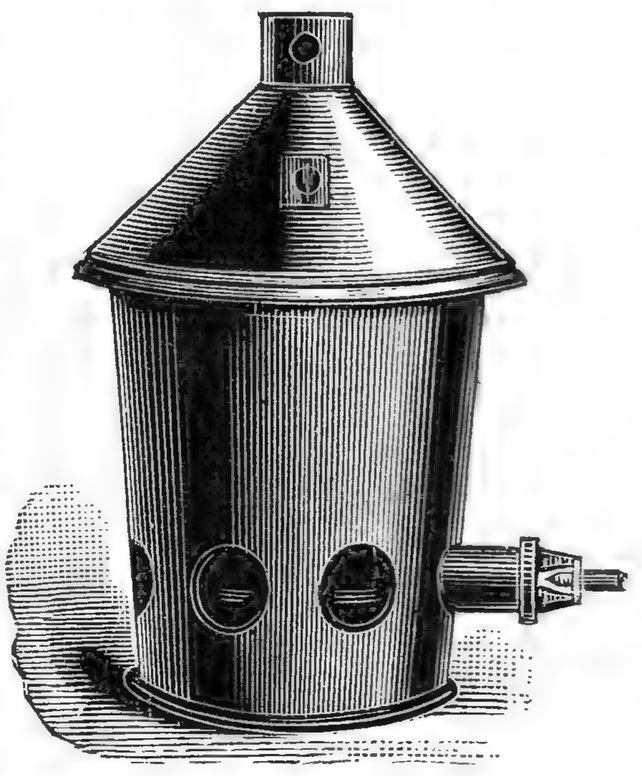
Furnace Open Ready for the Introduction of a Tube.

PRICES:

		12 in.	18 in.	24 in.
No. 17.	For draft or blast, with adjustable flame length,	$12.00	$16.00	$20.00
No. 17A.	As above, without adjustable length of flame, .	10.00	13.00	17.00
No. 17B.	With fixed length of flame, without blast, . .	8.00	11.00	14.00
Extra Fire-Clay Casing Blocks, 6 inches long, each, ...				.50

A pamphlet, "The Direct Determination of Carbon in Steel, Ferro-Alloys and Graphite," by Charles Morris Johnson, free upon application, describes an improved method of employing the No. 17 Tube Furnace.

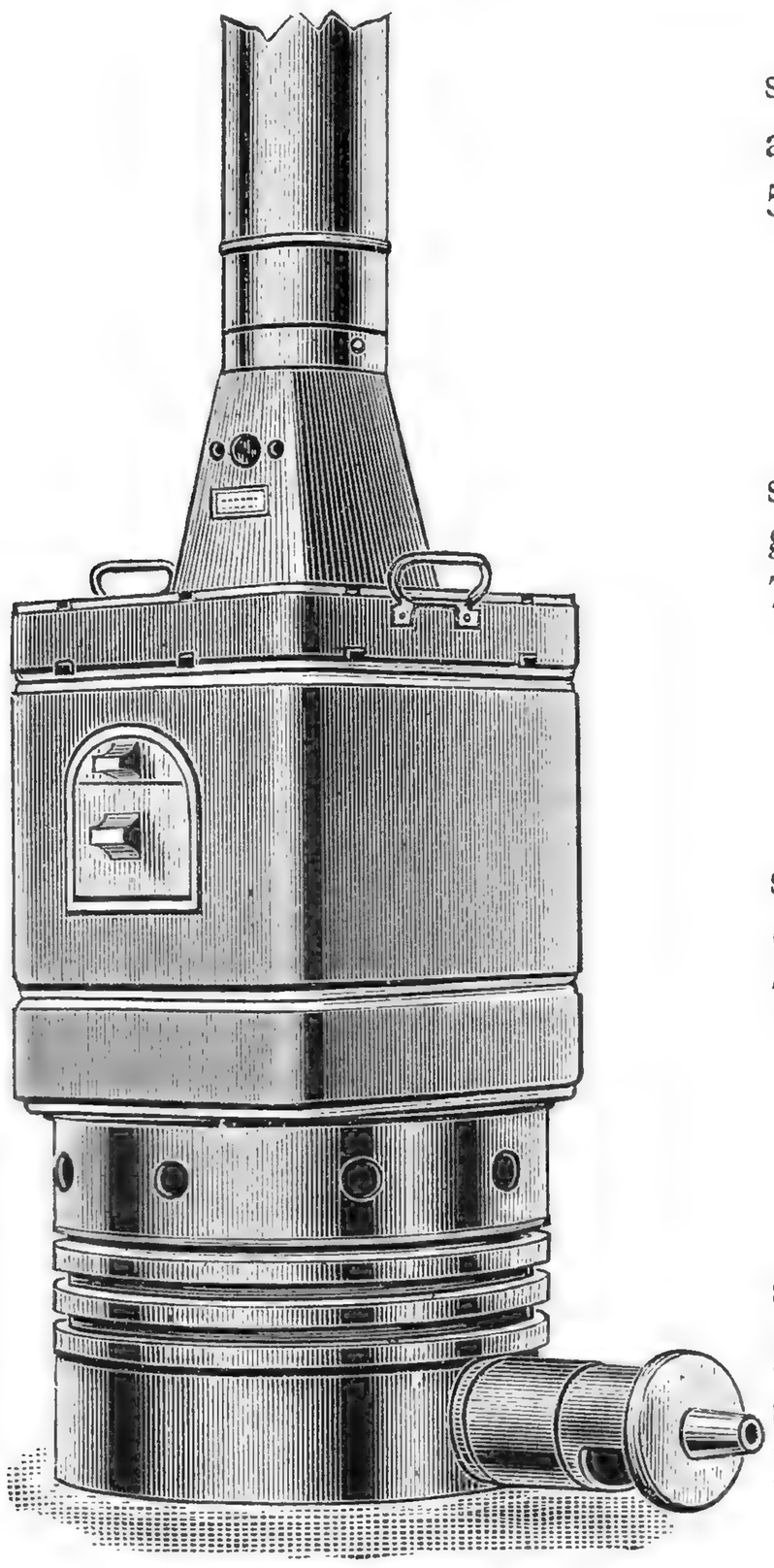
No. 14. LADLE FURNACE. With Fletcher's Solid Flame Heating Burner, for melting lead, tin, zinc, and their alloys. This is a better ladle furnace in every respect than any other made. The burner is simple, safe, and works equally well with any gas supply available, giving proportionate speed of working. It can be removed from the casing and used for other purposes, if desired. The worst possible accident to the burner can be remedied in a minute at the cost of a few cents. Capacity of burner, 35 feet per hour. Gas supply pipe required, ⅜-inch. For illuminating gas, but will be altered to burn natural gas without advance in price. Always sent for illuminating gas unless natural gas or gasoline gas is specified.


No. 14.

PRICES:

No. 14.	Ladle Furnace (Ladles extra)	$3.50
	With Cap-Nut Regulator for Gasoline Gas	3.80

MUFFLE FURNACES. For assaying, enameling and all purposes where exact temperatures are required, not exceeding the fusing point of copper. The burners for these furnaces are of the same construction as the No. 15.



Muffle Furnace. Size No. 4.

Size No. 3. With No. 15 burner. Inside muffle space, 3 x 4 x 2⅜ in. high. Requires ½-in. bore gas pipe and tap. Clay parts, 7¾ x 7¾ x 8 in. Inside space, 5¼ x 5¾ x 5¼ in. high. From table to top of lid, 16 in.

PRICE, No. 3 Muffle Furnace, ... $17.00
EXTRA, No. 3 Muffles or Domes, each, . 1.00

Size No. 4. With No. 4 burner. Inside muffle space, 3⅞ x 5⅞ x 3 in. high. Requires ¾-in. clear bore gas pipe and tap. Clay parts, 10 x 9 x 11 in. Inside space, 7½ x 6½ x 5¾ in. high. From table to top of lid 19½ in.

PRICE, No. 4 Muffle Furnace, ... $22.00
EXTRA, No. 4 Muffles or Domes, each, . 1.25

Size No. 5. With No. 5 burner. Inside muffle space, 4⅞ x 6⅝ x 4 in. high. Requires 1-in. pipe and tap. Clay parts, 11¾ x 10¾ x 14 in. Inside space, 8¾ x 7¾ x 6¾ in. high. From table to top of lid, 23 in.

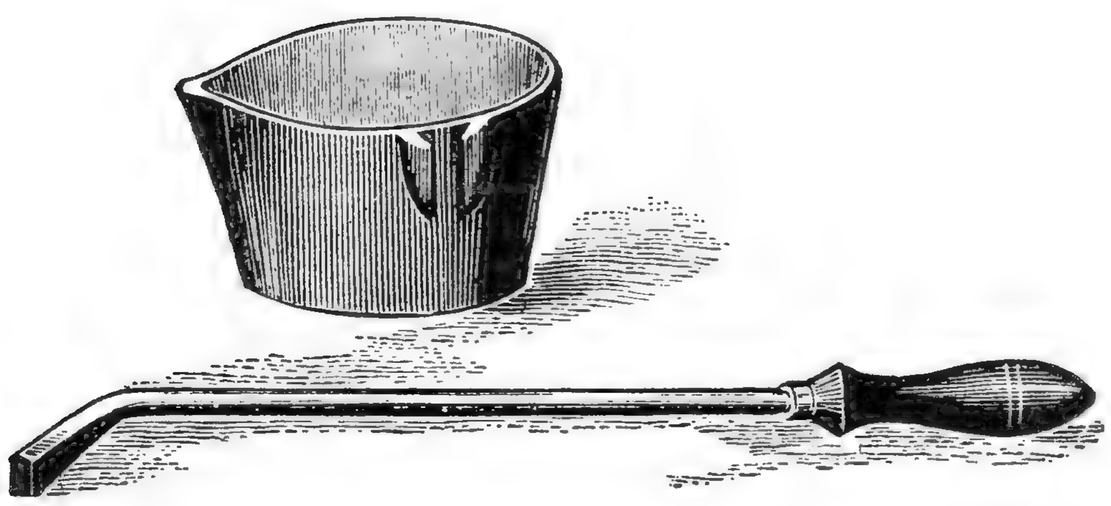
PRICE, No. 5 Muffle Furnace, ... $35.00
EXTRA, No. 5 Muffle or Domes, each, . 1.50

Size No. 6. With No. 6 burner. Inside muffle space, 6 x 8½ x 4⅞ in. high. Requires 1-in. clear bore gas pipe and tap. Clay parts, 14 x 15¼ x 17¼ in. Inside space, 10¼ x 9½ x 8¾ in. high. From table to top of lid, 27¼ in.

PRICE, No. 6 Muffle Furnace, ... $45.00
EXTRA, No. 6 Muffles or Domes, each, . 2.50

Muffle, Dome, Crucible Tongs and six feet of chimney pipe are included in the above prices.

These Muffle Furnaces may be operated with illuminating gas, natural gas or gasoline gas, without alteration.



LADLES WITH DETACHABLE HANDLES. For use with No. 14 Ladle Furnace; of cast iron, in three sizes: 4½ x 2¾, 4⅜ x 2¾, 4 x 2⅜ in. inside measurement. One handle will fit any ladle, and can be removed while ladle is on the fire. The prices of ladles and handles are therefore given separately below.

PRICES:

No. 14L.	Ladle, 4½ x 2¾ in., ...	40 cents
No. 14M.	Ladle, 4⅜ x 2¾ in., ...	35 cents
No. 14S.	Ladle, 4 x 2⅜ in., ...	25 cents
No. 14H.	Handles, each, ...	25 cents

No. 16. MELTING LADLE.

For melting soft metals. Cast iron, with wooden handle. Cut, full size. Length, including handle, 8 inches.



PRICE:

No. 16. Melting Ladle, . . . 25 cents

No. 3500. MALLEABLE MELTING LADLES.



Ladle and handle are one solid casting. Two pouring lips on opposite sides of the bowl as shown in cut.

PRICES:

No. 3500A.	3-inch bowl, each, ...	20 cents
No. 3500B.	4-inch bowl, each, ...	25 cents
No. 3500C.	5-inch bowl, each, ...	35 cents

B. D. M. CO.'S LOW TEMPERATURE MUFFLE FURNACE. This is our well-known high temperature assaying and enameling furnace as used for fusing glass and low fusing enamels.

In place of the elaborate concentric ring gas burner, developing extreme temperatures, the Low Temperature Muffle Furnace is fitted with our No. 52B Gas Burner.

The temperature developed by this burner is ample, positive, and under complete control of the operator. The fire-clay casing is so constructed as to disseminate the heat equally in all directions, and the muffle consequently constitutes a perfect fusing and annealing chamber.



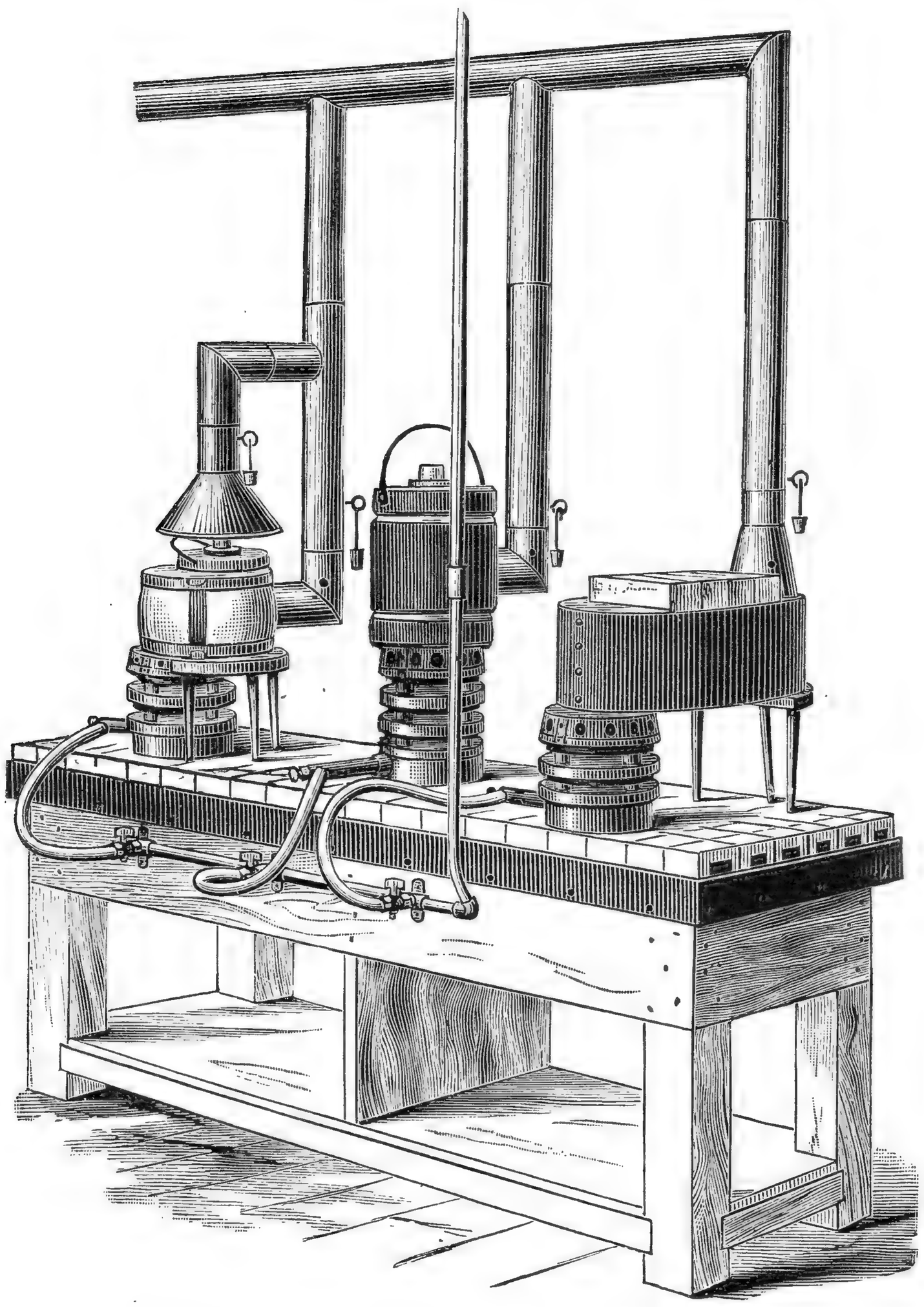
PRICES:

No. 4 Low Temperature Muffle Furnace with burner, six feet chimney pipe with damper and tongs $20.00

No. 5 Low Temperature Muffle Furnace with burner, six feet chimney pipe with damper and tongs $30.00

No. 6 Low Temperature Muffle Furnace with burner, six feet chimney pipe with damper and tongs $37.00

Dimensions of Clay bodies and muffle space, same as Muffle Furnaces on page 17.



No. 63. No. 15. No. 630

ASSAYER'S PLANT OF GAS FURNACES. The above illustration represents a group of gas assaying furnaces, as arranged by Walter Lee Brown for use in his laboratory. A full description of the plant appears in his "Manual of Assaying Gold, Silver, Copper and Lead Ores."

The furnace at the left (Fletcher No. 63) is for roasting sulphurets, etc.; the center one (Fletcher No. 15) is for crucible fusions, it taking No. 3 Plumbago crucible (4 inches deep by 3¾ inches across), and the one at the right is No. 630, "Monitor" furnace, for scorification and cupellation.

The price given includes the three furnaces, with plumbago fittings, chimney pipe, and horizontal gas pipe and three No. 114 ⅜-inch taps as illustrated. The vertical gas pipe, rubber tubing for connection and bench are not furnished except as extras.

These furnaces work equally well with illuminating gas, natural gas, or gasoline gas.

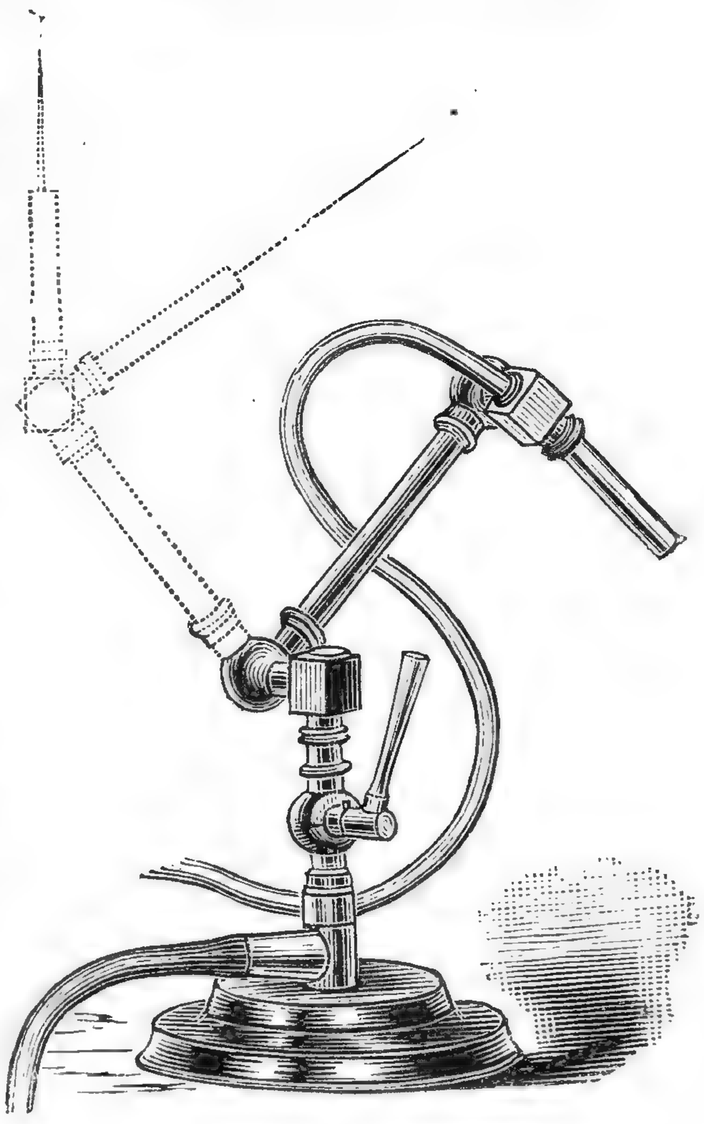
PRICES:

Assayer's Plant, without bench,	$57.00
Fire-Brick Covered Bench, extra,	32.00
Extra No. 114 Taps, ⅜-inch, each,	1.15

FLETCHER'S IMPROVED GAS BLOWPIPES.

Nos. 4 & 4A. IMPROVED HERAPATH BLOWPIPES. For illuminating gas only. A modification of the Herapath Blowpipe. It is double-jointed, and can be adjusted to deliver its flame in any desired direction. The flame is readily controlled, and it will be found a very useful tool in the laboratory or workshop. No. 4A is made in the same manner as No. 4, but without the lower joint, the upper joint being at the top of a stiff perpendicular tube. It has not, therefore, the adaptability of the No. 4.

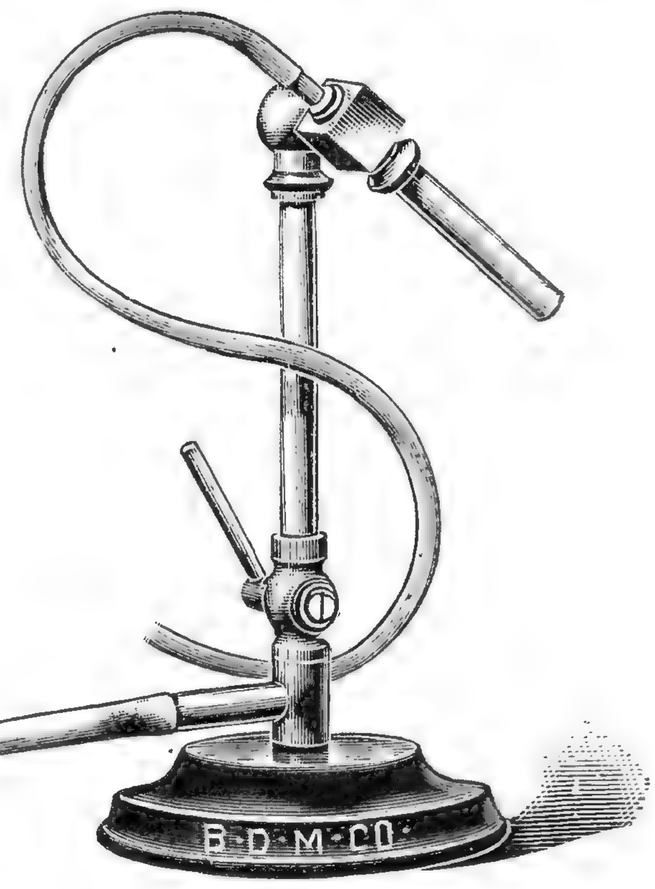
Either of these Blowpipes can be used in connection with the No. 9 or No. 10 Foot-Blower, or with a blast from the mouth. In the latter case a mouthpiece is required. One properly designed, which can be held between the teeth, leaving both hands free for the management of the work, with a shield-piece to sustain the lips, is illustrated by cut No. 42.



No. 4.

PRICES:

No. 4. Improved Herapath Blowpipe, double joint, $3.75
No. 4A. Improved Herapath Blowpipe, single joint, 3.00
Metal Mouthpiece, with shield to sustain the lips (see No. 42), ...60



No 4A.

No. 6A. AUTOMATON BLOWPIPE. This Blowpipe is as perfect in its way as the Injector Furnace, combining in the simplest possible form every quality essential to a perfect blowpipe.

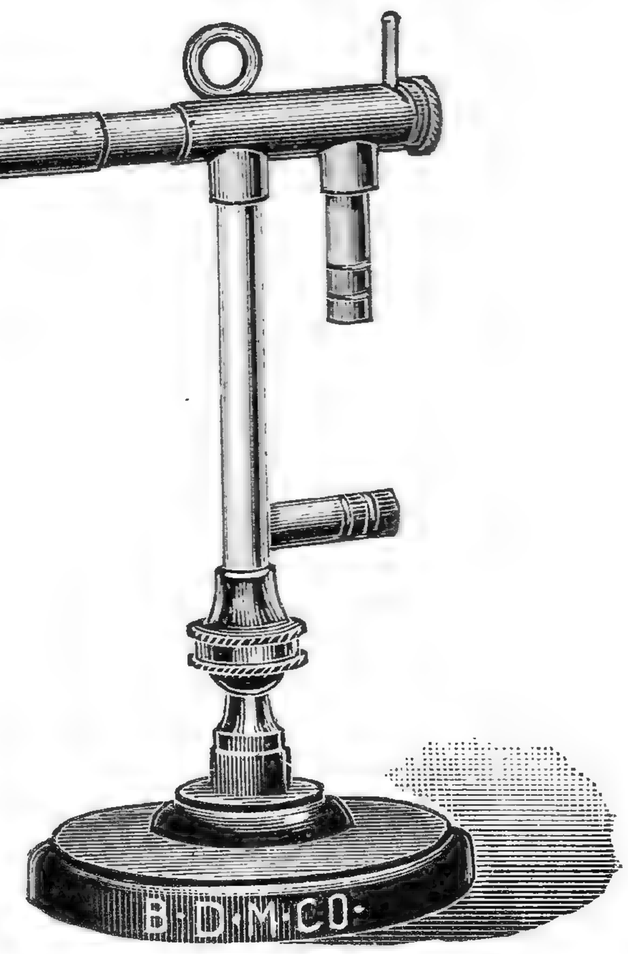
The No. 6A is mounted on a stand, with a universal ball joint, so as to enable it to be used at any angle, or in any position. It is simple, self-adjusting for *both gas and air*, requiring only a slight motion of a small lever to obtain instantly any flame, from the smallest to the largest. It is made for coal gas only.

All automatons have all the delicacy of the best mouth blowpipe used with the utmost skill, with the power and advantages obtained with a mechanical blower.

A slight motion from side to side of the lever changes the power and character of the flame instantly as required, or stops the blast without extinguishing the flame, the blowpipe being both self-lighting and self-adjusting. No. 6A requires Foot-Blower No. 9A or No. 10A.

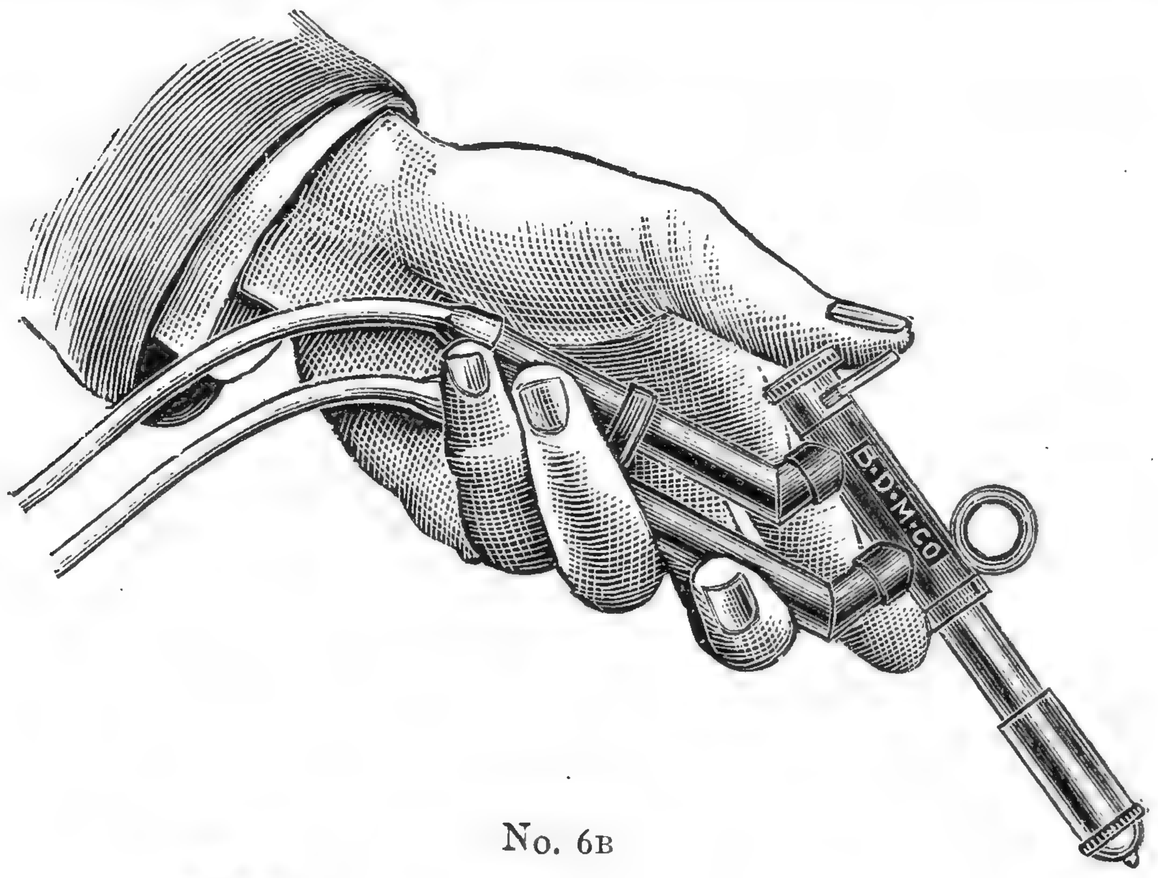
PRICES:

No. 6A. Automaton Blowpipe on stand, $4.00
Extra jet tips, any size to ⅛-inch bore, . .10



No. 6A.

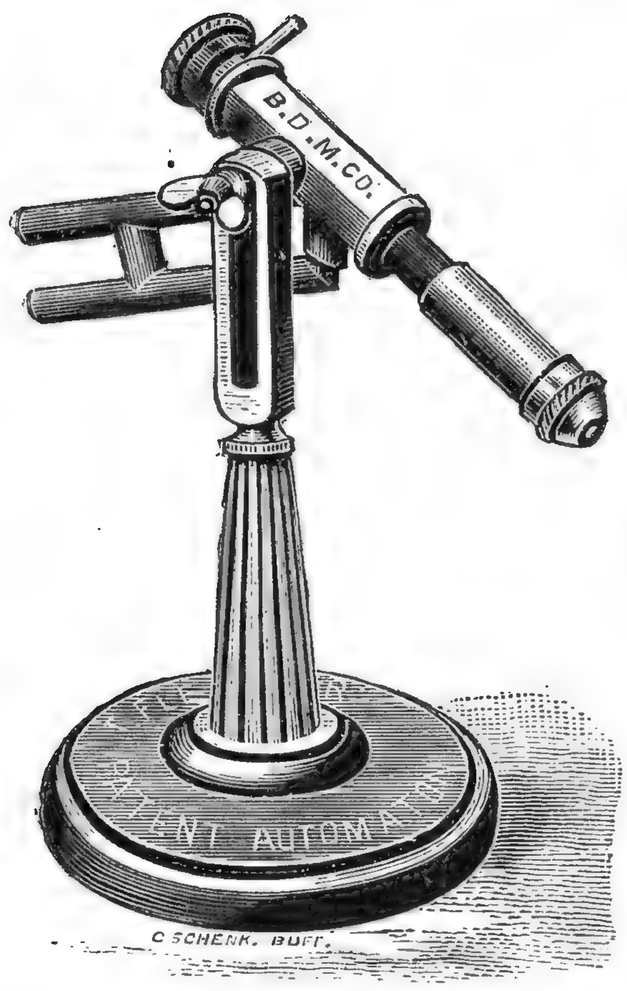
Nos. 6B & 6C. AUTOMATON HAND BLOWPIPES. For illuminating gas only. The engraving shows the hand blowpipe with both air and gas tubes underneath, forming a most convenient pattern for small work, brazing, annealing, etc. The No. 6B is of the same size as No. 6A, and requires a ⅜-inch bore gas pipe and tap. No. 6C is similar in construction to the No. 6B, but larger, and requires for its fullest power a ½-in. clear bore gas pipe and tap, and is adapted for the heaviest brass finishers' and bicycle makers' work. The No. 6B requires Foot-Blower No. 9A or No. 10A. No. 6C requires Foot-Blower No. 9B or No. 10B.



No. 6B

PRICES:

No. 6B. Automaton Hand Blowpipe, ... $3.50
No. 6C. Automaton Hand Blowpipe, ... 5.00



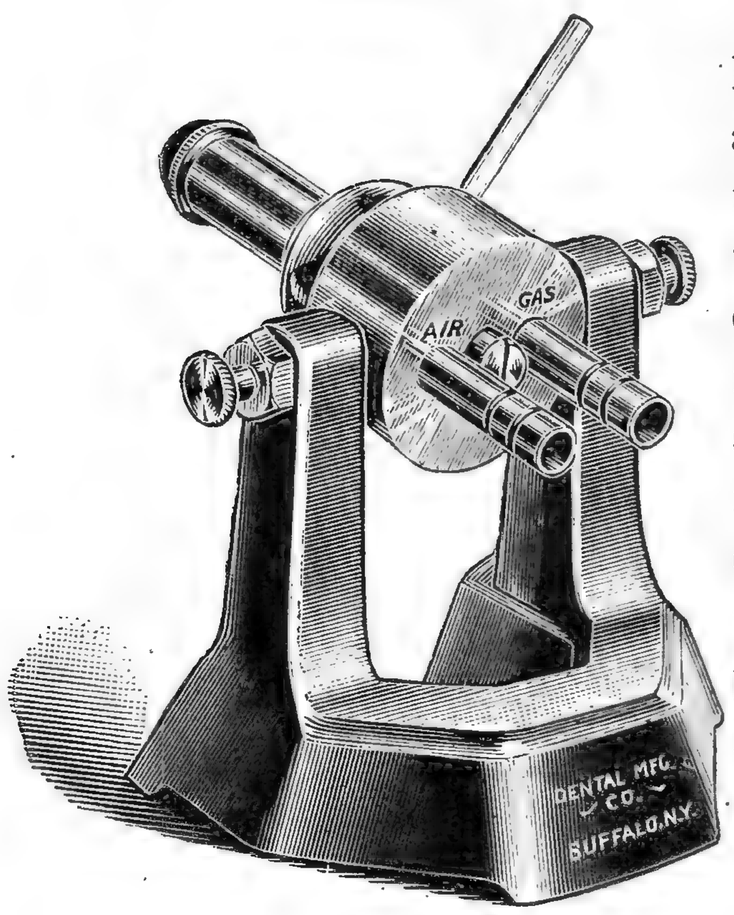
No. 6D.

Nos. 6D & 6E. AUTOMATON HAND BLOWPIPES ON STANDARD. For illuminating gas only. The Standard is adapted to either the No. 6B or 6C. The operator is thus enabled to use the Blowpipe on the table, in the same manner as the No. 6A. The swivel gives even greater latitude of adjustment than the No. 6A is capable of, while the Blowpipe is easily detached and capable of use in the hand.

No. 6D requires Foot-Blower No. 9A or No. 10A. No. 6E requires Foot-Blower No. 9B or No. 10B.

PRICES:

No. 6D. Automaton 6B on Standard, . . . $4.50
No. 6E. Automaton 6C on Standard, . . . 6.00



No. 20

No. 20. FLETCHER'S COMPOUND BLOWPIPE. For illuminating gas only. For glass workers and experimental laboratories. This is a double concentric Blowpipe, which has an inner air jet and a middle tube, which may be used either for air or gas, and an external gas tube. The gas and air are changed automatically from the larger to the smaller blowpipes by a slight movement of the lever at the back, the same movement also adjusting both gas and air to each other for each blowpipe. The combination of two blowpipes in this manner gives a great range of power, from a delicate pointed jet to a brush flame, using 35 feet of gas per hour.

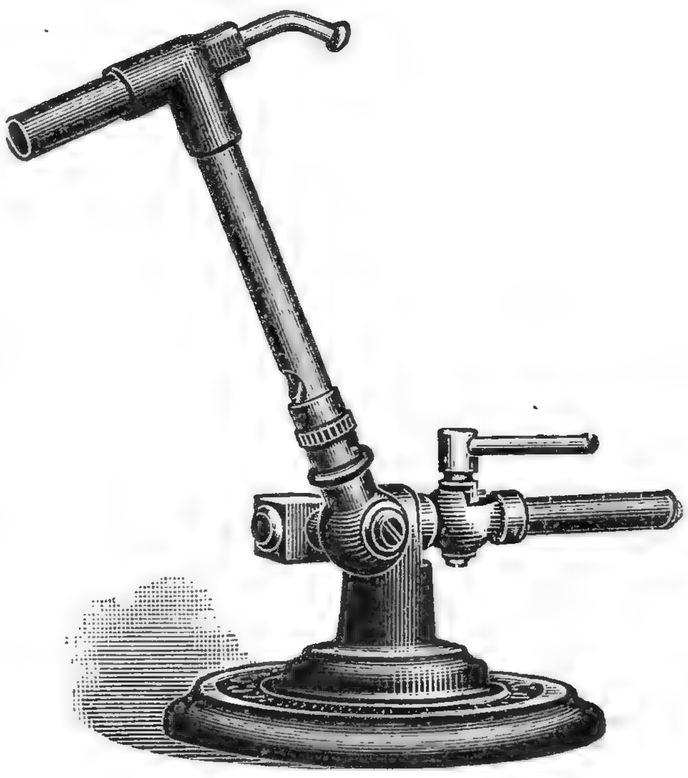
No. 20 requires Foot-Blower No. 9B or 10B.

PRICE:

No. 20. Compound Blowpipe, ... $10.00

No. 4C COMBINED BLOWPIPE AND BUNSEN. The No. 4c Blowpipe and Bunsen combines an excellent bench Blowpipe with an exceptionally efficient Bunsen in such manner that the change from one to the other is a matter of but an instant.

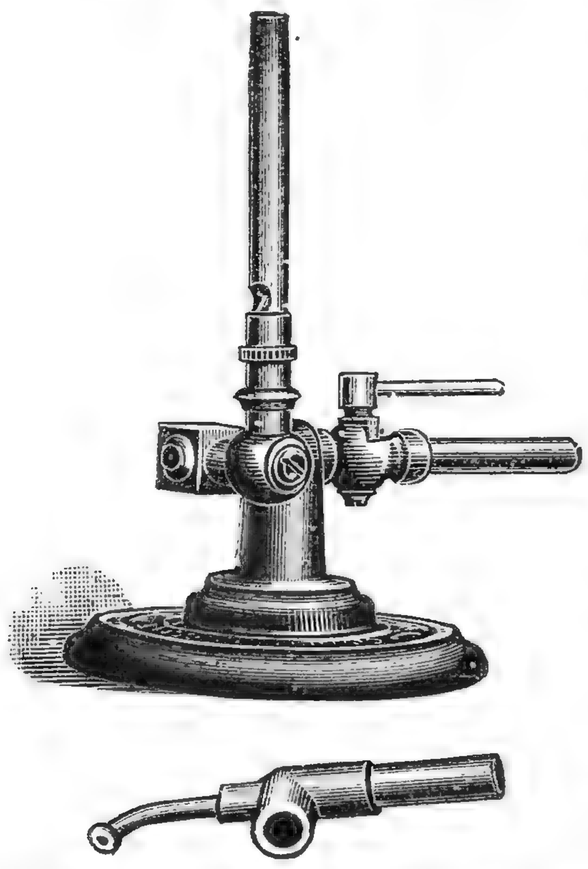
The Blowpipe head is fitted to the Bunsen by a taper joint, and is ready for instant use by keeping the air tube of the head connected to the bellows. It can be turned in any direction to bring the flame to the desired location. A swivel at the base affords a wide range of adjustment in position, so both appliances become practically universal in their scope.



No. 4c as a Blowpipe.

The Blowpipe flame is of the kind which can be operated with a blast from the mouth, a foot-blower, or compressed air, as preferred, and will give good results under all conditions. A very fine needle point flame is readily produced with a light blast, or plenty of gas and a heavy blast will give a large and powerful brush flame.

The Bunsen is provided with a threaded air shutter, which is capable of much closer adjustment than the slide commonly used, and is not likely to be accidentally thrown out of adjustment.

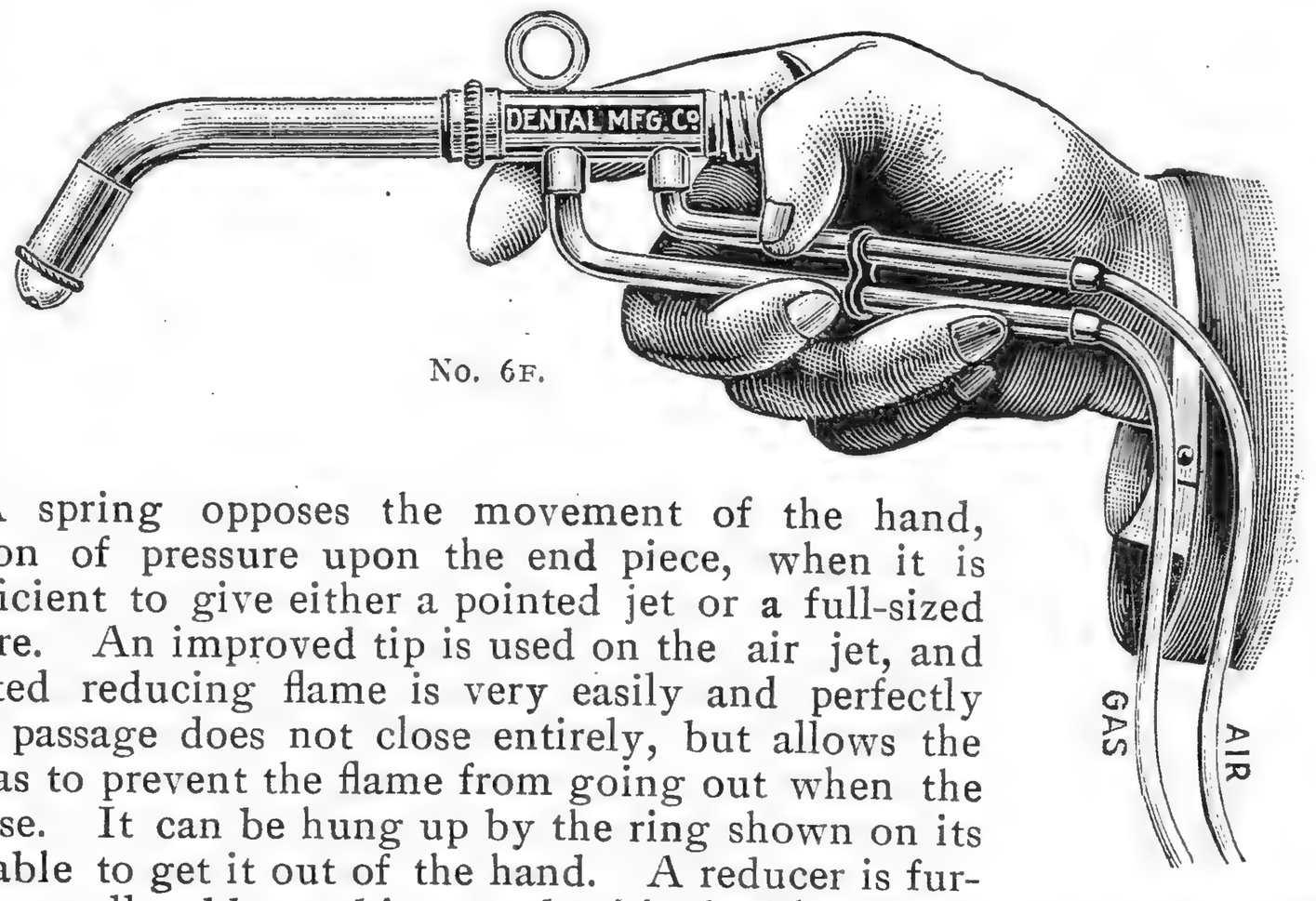


No. 4c as a Bunsen with Blowpipe Head Removed.

This combination will do practically all the soldering of a dental laboratory or jewelers' workshop and do it to your entire satisfaction. Illuminating gas only. Oxidized copper finish.

PRICE—No. 4c Combined Blowpipe and Bunsen, ... $3.00

No. 6F AUTOMATON BLOWPIPE. For illuminating gas or acetylene gas. For light soldering, etc. The illustration shows this Blowpipe one-third size. It is an improved and smaller pattern of the Fletcher Automaton. It is made of smaller tubing than the No. 6A or 6B Automaton, the end being bent at an angle to give greater facility in directing the flame. Its length is increased, removing the hand farther from the heat. The adjustment nozzle is operated by a slip-joint, as in the other patterns of the Automaton Blowpipe. The supply of gas and air is controlled by a longitudinal movement of the tube, instead of a rotative one. A spring opposes the movement of the hand, and a slight variation of pressure upon the end piece, when it is held as shown, is sufficient to give either a pointed jet or a full-sized brush flame at pleasure. An improved tip is used on the air jet, and the small blue-pointed reducing flame is very easily and perfectly produced. The gas passage does not close entirely, but allows the passage of enough gas to prevent the flame from going out when the blowpipe is not in use. It can be hung up by the ring shown on its body when it is desirable to get it out of the hand. A reducer is furnished, by which the small rubber tubing used with the blowpipe can be connected with the larger tubing which fits the blower nozzle.



No. 6F.

The "regulating nut," shown in the illustration under the forefinger, is for the purpose of allowing the blowpipe to be set to give a blue-pointed flame; a brush flame can then be used, and instantaneously changed to a pointed flame at pleasure, and without special effort of the hand to keep the proper adjustment. This blowpipe is successfully used with acetylene gas. No. 6F requires No. 9, No. 10 or No. 90 Foot-Blower.

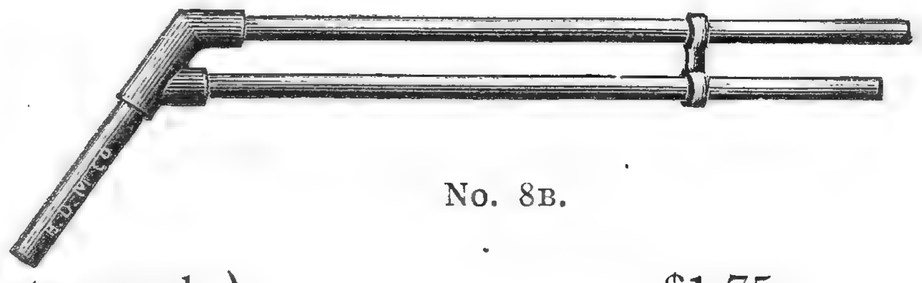
PRICE—No. 6F. Automaton Blowpipe, ... $2.00

BRAZING BLOWPIPES.

Nos. 8B, 8C, 8E, 8F, & 8G. BRAZING BLOWPIPES. These Blowpipes are extensively used by machinists, tool-makers and bicycle manufacturers and repairers, for annealing, heating tools for hardening, and brazing articles that require great heating power. They are also largely used for brazing wire or tape in automobile and vehicle tires.

They are quick in their operation, and are convenient and more economical than a forge. For tool-room purposes they are unexcelled. The brazing blowpipes are made in five styles, and three sizes, as follows :

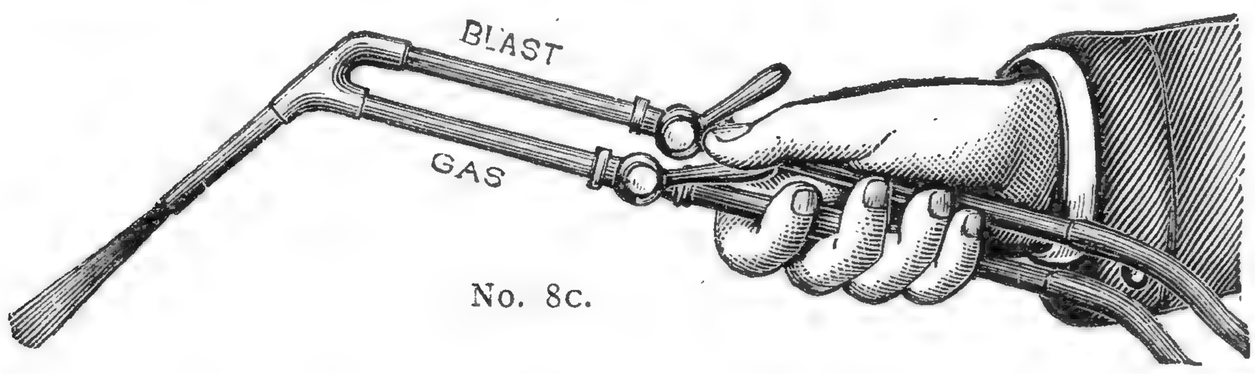
No. 8B BRAZING BLOWPIPE. $\frac{1}{8}$-inch air jet, $\frac{7}{16}$-inch gas opening, without stop-cocks. Requires $\frac{3}{8}$-inch gas supply pipe and tap.



No. 8B.

PRICE—No. 8B Blowpipe (without stop-cocks), ... $1.75

No. 8C BRAZING BLOWPIPE. Requires $\frac{3}{8}$-inch gas supply pipe and tap. $\frac{1}{8}$-inch air jet, $\frac{7}{16}$-inch gas opening, with stop-cocks.



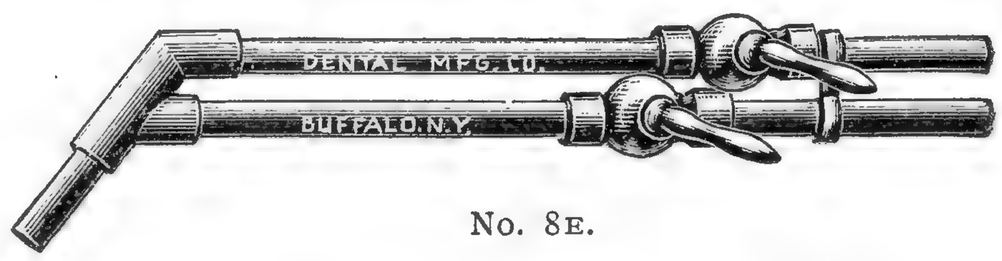
No. 8C.

Nos. 8B and 8C require No. 9A or No. 10A Foot-Blower.

Will be supplied to burn natural gas or gasoline gas if desired without advance in list. Always supplied for illuminating gas unless otherwise specified.

PRICE—No. 8C Blowpipe, with two lever stop-cocks, ... $2.50

No. 8E BRAZING BLOWPIPE. $\frac{3}{16}$-inch air jet, $\frac{5}{8}$-inch gas opening, with stop-cocks. Requires $\frac{1}{2}$-inch gas supply pipe and tap. For illuminating gas, unless otherwise specified. Adapted to burn natural gas or gasoline gas without advance in list.

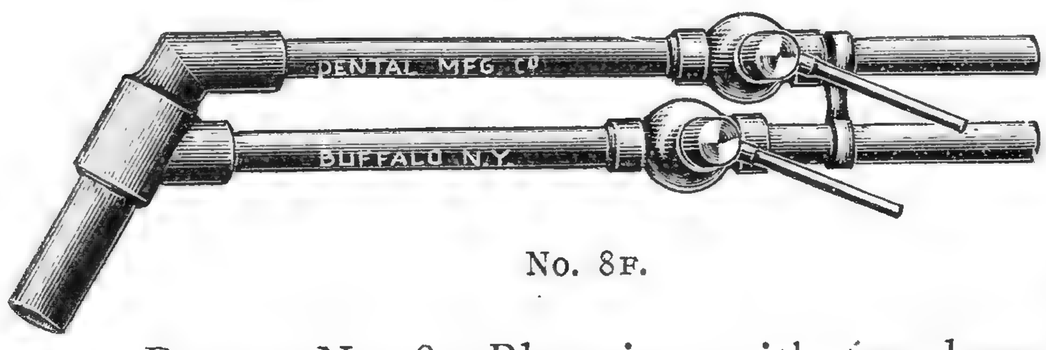


No. 8E.

PRICE—No. 8E Blowpipe, with two lever stop-cocks, ... $3.50

No. 8F BRAZING BLOWPIPE. $\frac{5}{16}$-inch air jet, 1-inch gas opening, gas nozzle of steel tubing, with stop-cocks. New pattern for large work. Requires $\frac{3}{4}$-inch gas supply pipe and tap. For illuminating gas only.

The stop-cocks are both under perfect control of the thumb of the hand holding the blowpipe. No. 8F is the blowpipe used on B. D. M. Co.'s Brazing Stand.

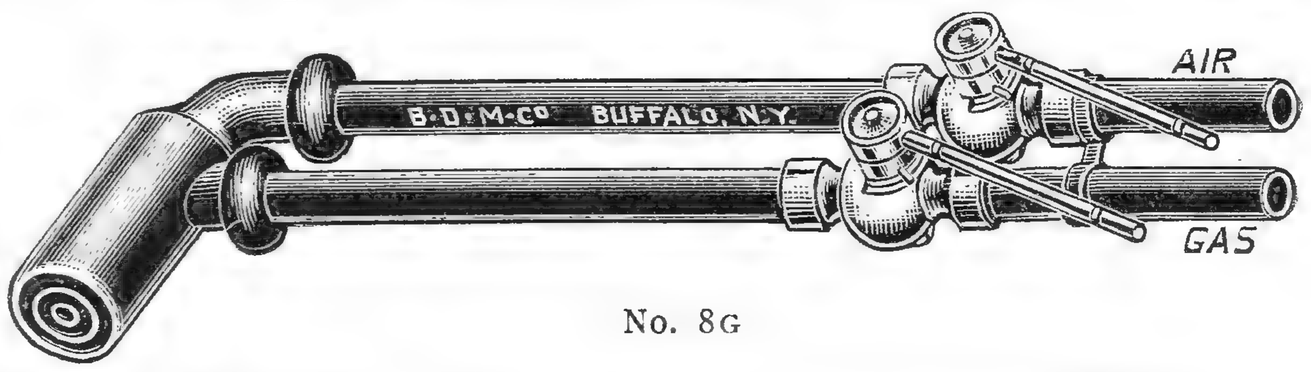


No. 8F.

Nos. 8E and 8F require No. 9B or No. 10B Foot-Blower. More satisfactory results, however, are obtained by using a power-blower. See power-blowers.

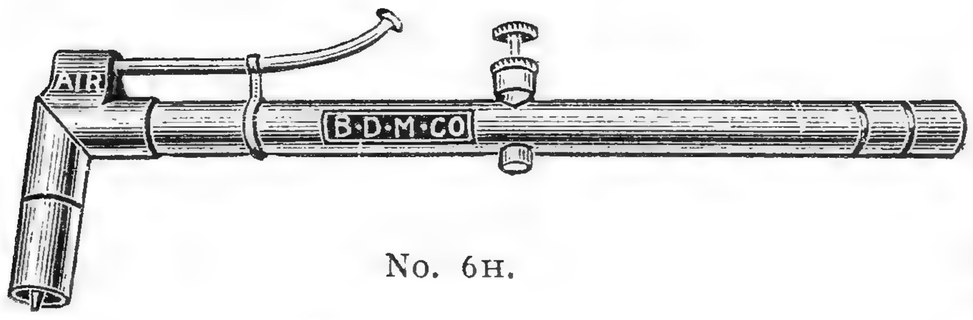
PRICE—No. 8F Blowpipe, with two lever stop-cocks, ... $4.25

No. 8G BRAZING BLOWPIPE. For natural gas. Non-extinguishable This blowpipe is made of iron throughout, except the cocks, which are of brass. It is designed for natural gas, but will work equally well with illuminating gas. Power and capacity the same as No. 8F.



No. 8G

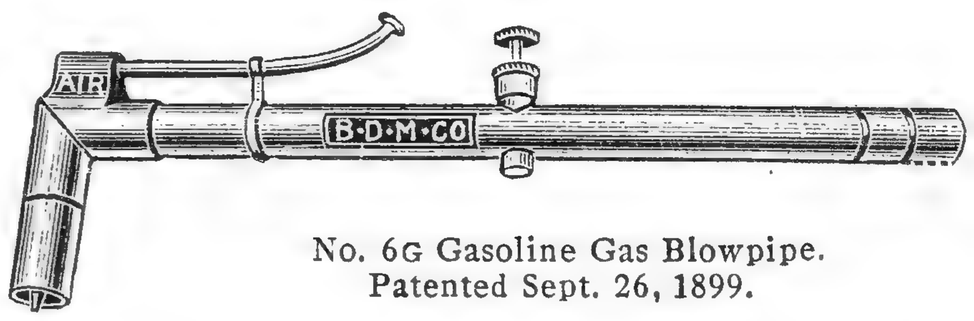
PRICE—No. 8G Blowpipe for natural gas, ... $4.25



No. 6H.

No. 6H BLOWPIPE. For natural gas. Non-extinguishable. This Blowpipe, exclusively used for natural gas, has been improved by the substitution for the ordinary air and gas outlet tubes, of a concentrating chamber surrounding the air jet, and a deflecting sleeve covering both gas and air outlets. It is stamped "Natural Gas" on the large tube.

PRICE—No. 6H Blowpipe for natural gas, ... $2.50



No. 6G Gasoline Gas Blowpipe.
Patented Sept. 26, 1899.

No. 6G BLOWPIPE. For gasoline gas. Non-extinguishable. This Blowpipe, exclusively used for gasoline gas as produced by our generators, has been improved by the substitution for the ordinary air and gas outlet tubes, of a concentrating chamber surrounding the air jet, and a deflecting sleeve covering both gas and air outlets. This arrangement prevents the extinguishing of the flame at a critical moment, by over-pressure or any other cause.

A new method of regulating the size of the flame has been adopted, which requires a simple partial rotation of the controlling valve to produce a fine pointed flame, up to one, three or four inches long. The large brush flame is obtained by depressing the valve stem.

The No. 6G Blowpipe is used with the No. 40C and No. 45 Gasoline Gas Generators and is intended for light soldering and melting only. It is stamped "Gasoline" on the large tube.

PRICE:

No. 6G Gasoline Gas Blowpipe, ... $2.50

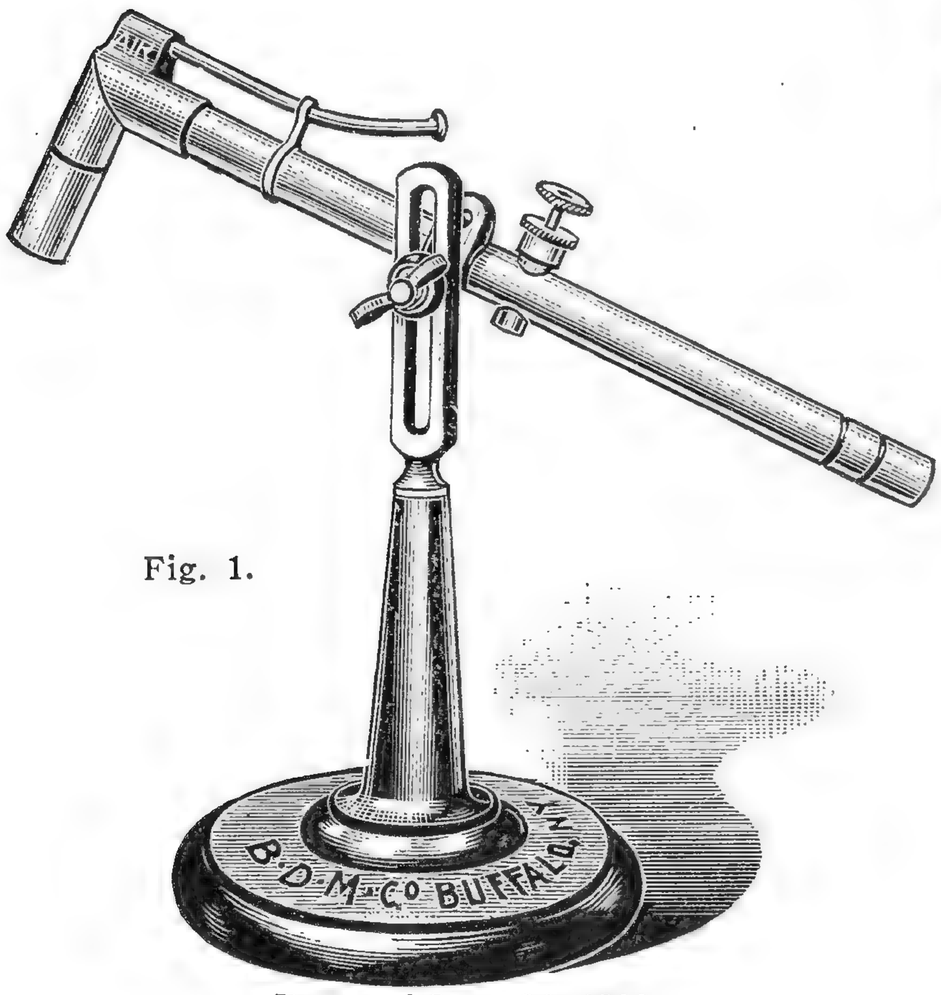


Fig. 1.

Patented Sept. 26, 1899.

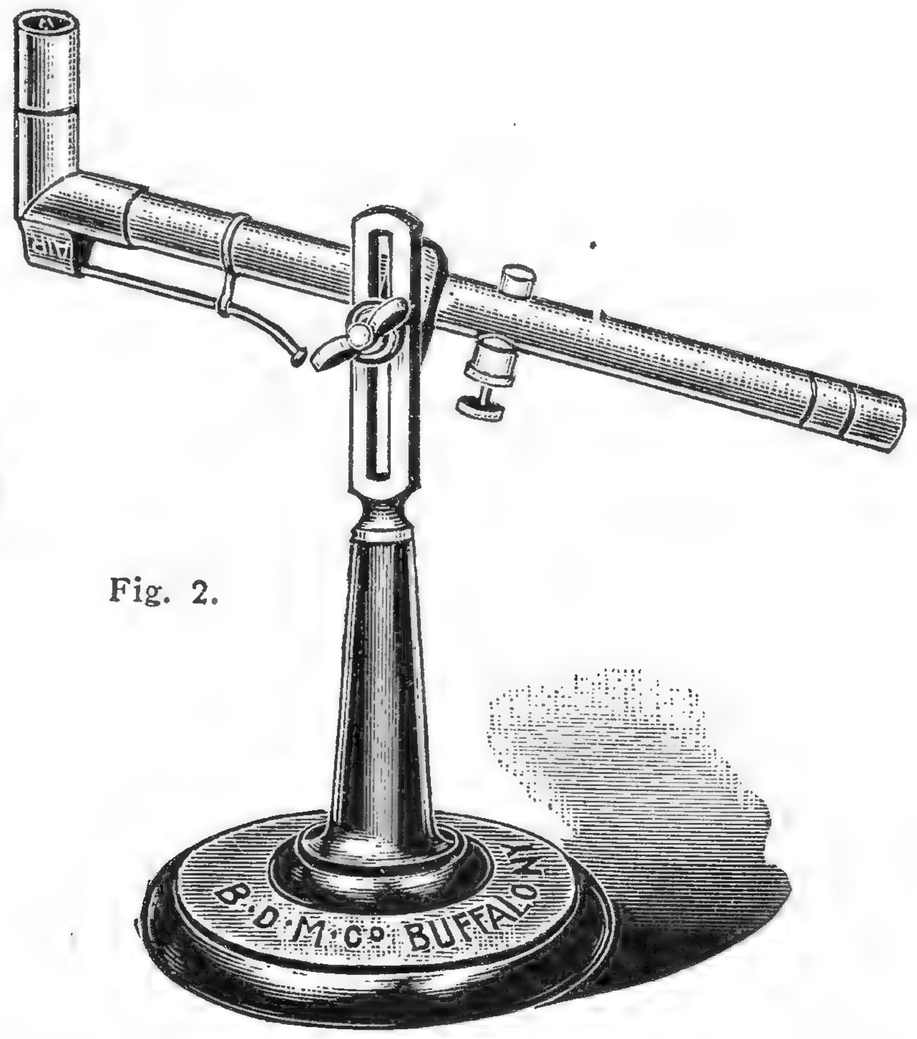


Fig. 2.

No. 6G BLOWPIPE STAND. For the convenience of those desiring a support for the No. 6G Blowpipe, for gasoline gas, or No. 6H Blowpipe, for natural gas, the stand illustrated below will be found very useful. The Blowpipe can be raised or lowered a distance of two inches, and by means of a clamp secured by a thumb-nut it can be placed at any desired angle. When arranged as in Fig. 2, it may be readily adjusted for heating retorts, etc.

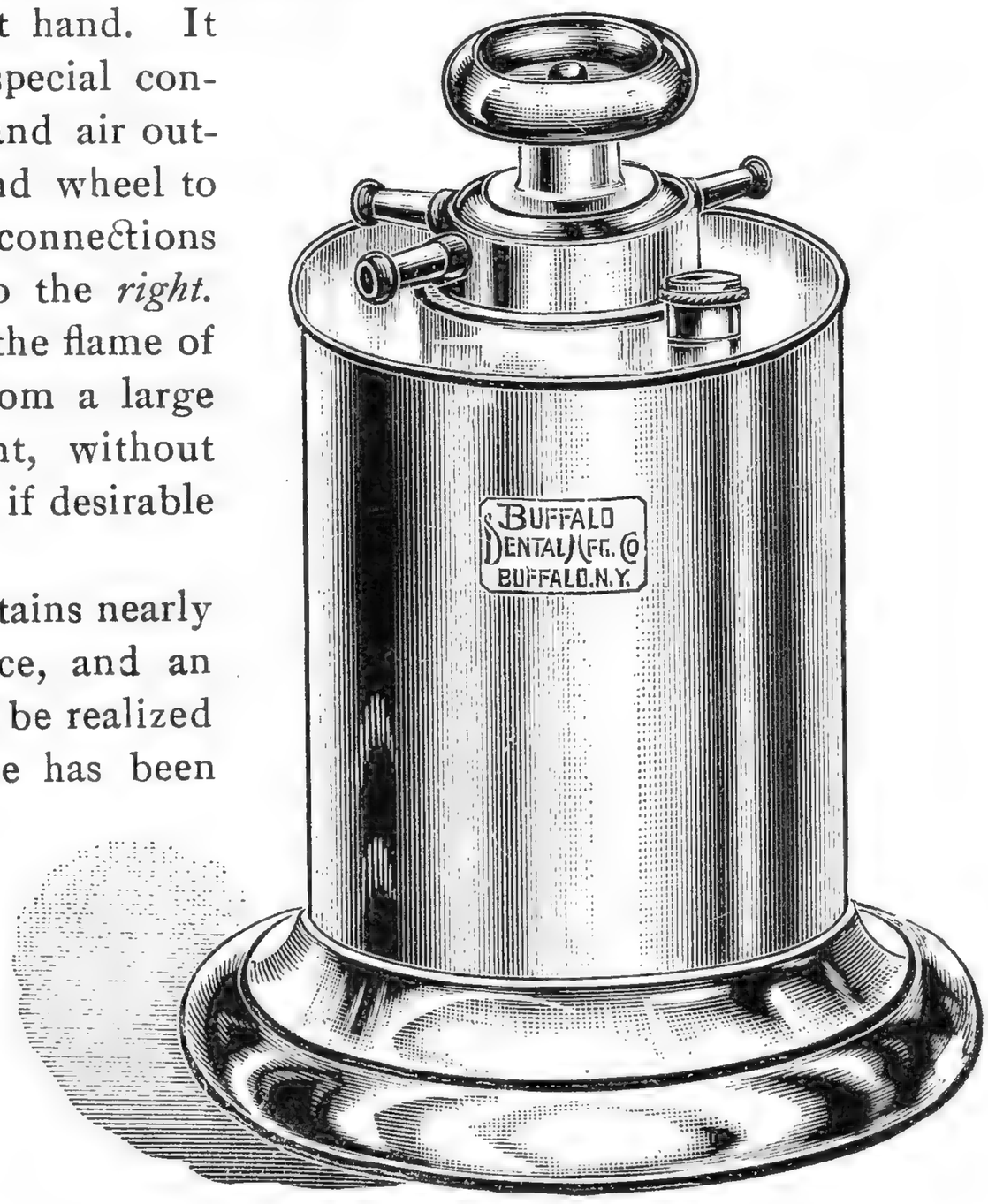
PRICE:

No. 6G Blowpipe Stand, ... $1.00

GASOLINE GAS GENERATORS.

No. 45. B. D. M. CO.'S GASOLINE GAS GENERATOR. This Generator embodies our experience of many years in the manufacture of similar apparatus, besides containing several useful and novel devices for convenience in operating. The Generator is made wholly of brass, polished and nickeled. It is very ornamental and of first-class workmanship, and is worthy a place in any laboratory. The Generator is 4½ inches in diameter and 7 inches high. It is designed to be placed on the laboratory bench within easy reach of the right hand. It is surmounted by a turret valve of special construction, which controls both gas and air outlets by partially revolving the hand wheel to the *left*, and completely shuts off all connections from the Generator by turning to the *right*. By means of this valve the size of the flame of the blowpipe can be controlled from a large brush flame to a fine needle point, without operating the valve of the blowpipe if desirable to do so.

The interior of the generator contains nearly 14 lineal feet of evaporating surface, and an idea of its generating capacity can be realized from the fact that when the gasoline has been removed from the Generator, there still remains gas enough to operate the blowpipe for some minutes. The safety of the Generator when used according to instructions, has been provided for by the introduction of the usual series of gauze disks which are designed to prevent the flashing back of flame. An air check is attached to the end of the filler tube to prevent overfilling. The method of connecting foot-blower and blowpipe is plainly shown under the head of Gasoline Gas Blowpipes.



No. 45 Gasoline Gas Generator.
Patented Sept. 19, 1899.

The No. 6G blowpipe is the only one suitable for use in connection with No. 45 Gasoline Gas Generator.

PRICE:

No. 45. B. D. M. Co.'s Gasoline Gas Generator, as illustrated, . . $9.00
Rubber connecting tubing not included in price.

Reduced volume of gas producing a sluggish and ineffective flame, is usually caused by chilled gasoline. Should the flame fail entirely or diminish in size without apparent cause, set the Generator in a pan of hot water for five or ten minutes when the volatile character of the contents will be fully restored. Obstruction of the passages through turret will also cause sluggishness of action. A small piece of cloth attached to a piece of wire and passed through the openings will serve to clear them. Keep the inner or air jet of blowpipe clear by occasionally entering a fine wire at the nozzle to dislodge any possible obstruction. Increase in the air pressure will not overcome the trouble, a very light but steady blast of air giving best results. The vapor is consumed as produced; hence the air pressure applied should never exceed one pound to the square inch or the maximum capacity of the smallest size "B. D. M. Co.'s" Foot-blower. Under no circumstances must nitrous oxide be used in connection with gasoline gas.

B. D. M. Co.'s Gasoline Gas Generators are not intended or recommended for use in connection with high pressure air compressors.

No. 40C. and No. 44 GASOLINE GAS GENERATORS. These well-known Generators have been in use for many years and have given universal satisfaction in supplying a cheap and efficient means of utilizing the vapor of gasoline for furnace and blowpipe work.

No. 40C. Size 4 by 4 by 10 inches, capacity about one quart of gasoline.

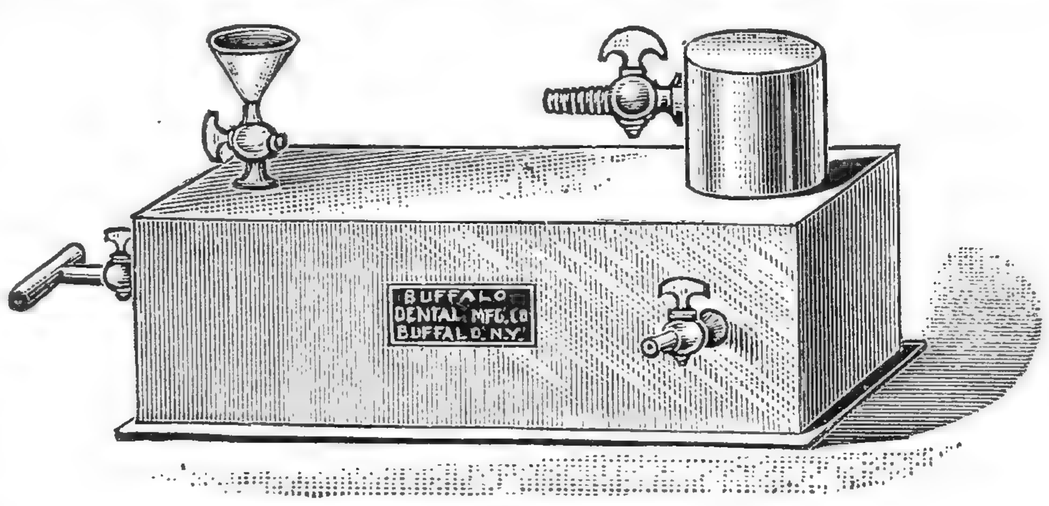
No. 44. Size 10 by 10 by 18 inches, capacity about one and a half gallons of gasoline.

No. 44 is shown in connection with No. 41 Furnace, under Gasoline and Gas Furnaces.

These generators can be used where gas is not available. The vapor produced by them gives a flame and heat of absolute purity for the most delicate chemical operations where gas cannot be used owing to the presence of sulphur and other impurities.

Blowpipes listed "for gasoline gas" may be used in connection with these Generators.

To charge the Generator, pour gasoline in the funnel cock until it overflows at the small tap in the side of the Generator near the bottom; then close the funnel cock and also the overflow tap.



No. 40c

Gasoline varies much in quality. It must, when a few drops are poured on a plate or on the hand, evaporate quickly and completely, leaving no greasy stain, and, if good, it will produce more vapor than a No. 41A Furnace will consume at its maximum power. 74° or 76° gasoline, such as is used in "vapor stoves" for culinary purposes, is the most suitable for use in these Generators. Lower grades do not give as good results.

NOTE—The Gasoline Gas Generator is useless except with a supply of air under pressure. It cannot be used with draft furnaces. Air pressure should not exceed one pound per square inch.

PRICES:

No. 40C.	Gasoline Gas Generator,	$ 6.00
No. 44.	Gasoline Gas Generator,	15.00

Rubber connecting tubing not included in prices.

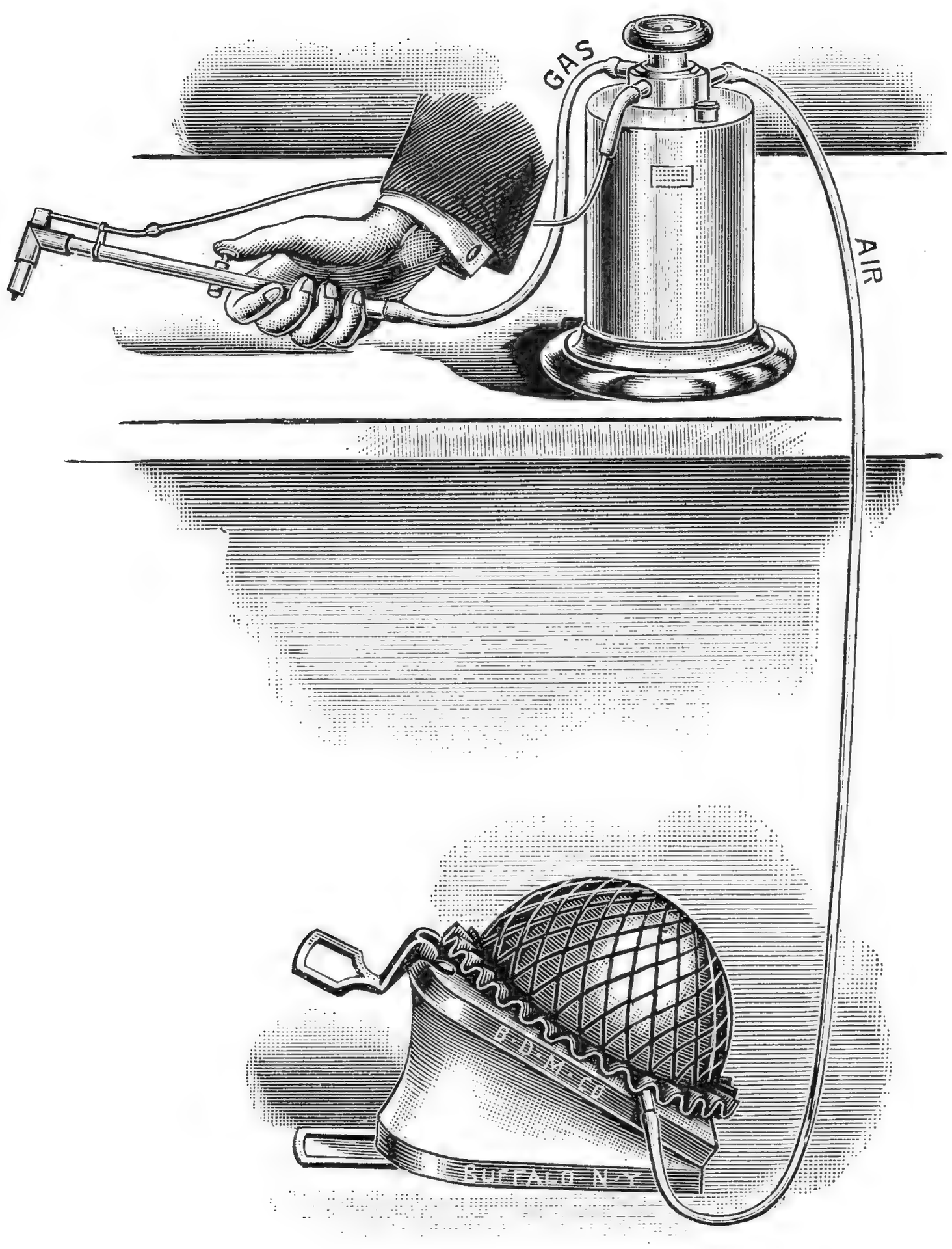
GASOLINE GAS BLOWPIPES.

No. 45. GASOLINE GAS GENERATOR. AS USED WITH NO. 6G BLOWPIPE. This Generator is made wholly of brass, polished and nickel plated. It is very ornamental and of first-class workmanship throughout. It is more fully described under the head of Gasoline Gas Generators.

The No. 6G Blowpipe, exclusively used with No. 45 and No. 40C Generators, has been improved so that it is non-extinguishable. A new method of regulating the size of the flame has been adopted, which requires but a partial rotation of the controlling valve to produce any desired length of flame. See full description under head of No. 6G Blowpipe.

The Generator and Blowpipe mounted, as illustrated in the following pages, is by far the most serviceable, efficient and beautiful of any similar apparatus yet produced. It is particularly useful in a chemical laboratory, and especially so for blowpipe operations before a class.

No. 45 Generator and No. 6 G Blowpipe.—*Continued.*



No. 6G and No. 45.
Patented Sept. 19 and 26, 1899.

PRICES:

No. 45.	B. D. M. Co.'s Gasoline Gas Generator,	$9.00
No. 45.	B. D. M. Co.'s Gasoline Gas Generator, with rubber connecting tubing and brass reducer,	10.70
No. 45.	B. D. M. Co.'s Gasoline Gas Generator, with No. 6G Blowpipe, rubber connecting tubing and reducer,	12.50
No. 45.	B. D. M. Co.'s Gasoline Gas Generator, with No. 6G Blowpipe, rubber connecting tubing, reducer, and No. 9 Foot-Blower, complete, ready for use,	17.50

No. 40C GASOLINE GAS GENERATOR. As used with No. 6G Blowpipe. The No. 6G Blowpipe is made expressly for use with gasoline gas as generated by No. 40C and No. 45 Gasoline Gas Generators. This Generator is a safe and simple arrangement, giving a power and efficiency fully equal to that which can be obtained from coal gas. It is recommended where gas is not available.

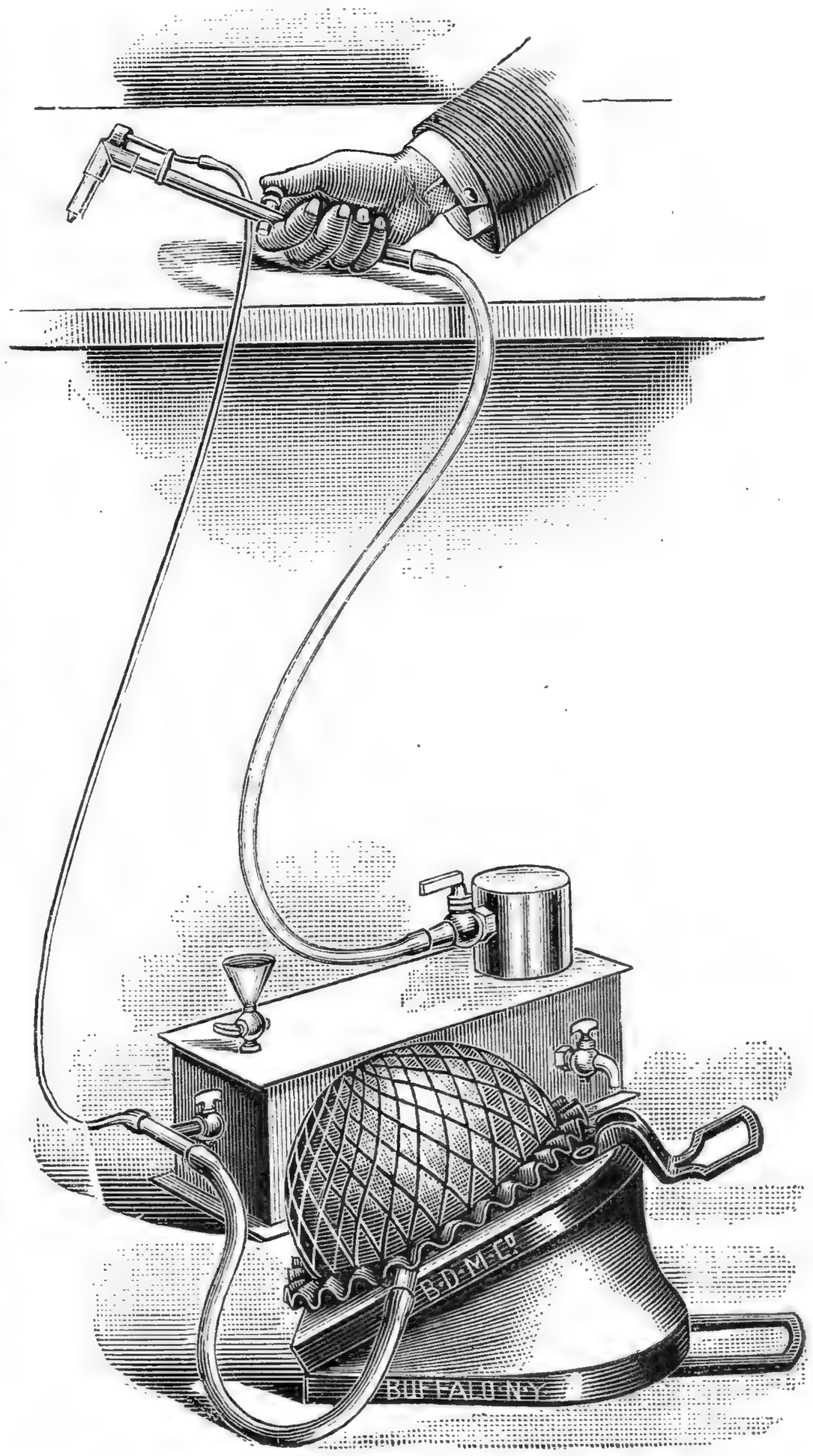
The Generator is useless except with a supply of air under pressure, and will, therefore, have to be operated in connection with a foot-blower, as shown in the illustration.

See full description under head of Gasoline Gas Generators.

This outfit is extensively used by jewelers where gas is not available.

PRICES:

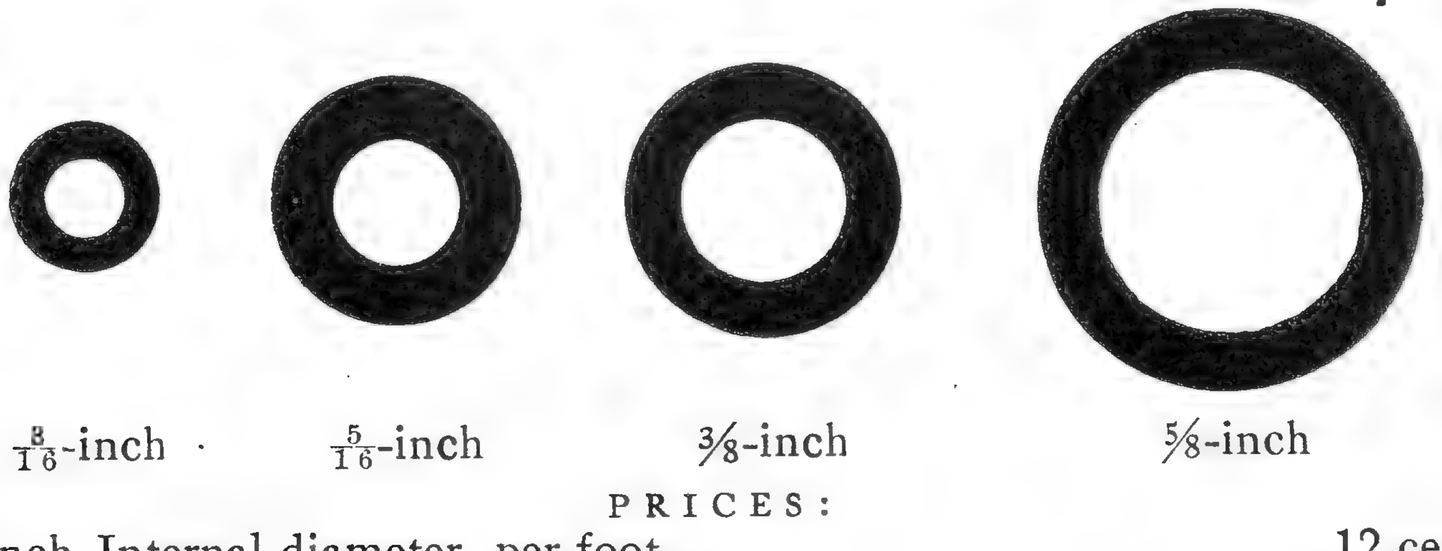
No. 6G.	Blowpipe, ...	$2.50
No. 9.	Foot-Blower, ...	5.00
No. 40C.	Generator, ...	6.00
No. 6G.	Blowpipe, No. 9 Foot-Blower, No. 40c Generator, Rubber Connecting Tubing, and one Reducer, complete, ready for use, ...	14.50



No. 6G and No. 40C. Patented Sept. 26, 1899.

ANTIMONY RUBBER TUBING. The cuts show thickness of walls of the Antimony Rubber Tubing made exclusively for our trade. It will not kink readily, but is sufficiently elastic to stretch over connections with openings of same inside diameter as tubing. Made of pure stock and much more lasting than the ordinary rubber tubing. Very desirable for gas and air connections in blowpipe and furnace operations.

Rubber Tubing, ¼-inch, with $\frac{1}{16}$-inch wall, is not illustrated and is used in connection with No. 90 Foot-Blower only. Antimony tubing supplied any length up to 12 feet.



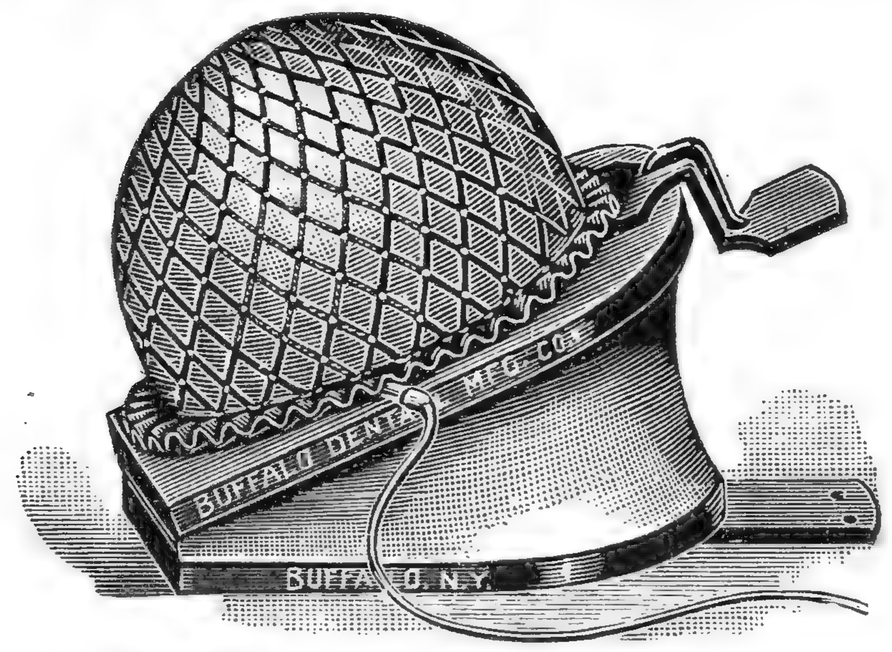
$\frac{3}{16}$-inch $\frac{5}{16}$-inch ⅜-inch ⅝-inch

PRICES:

$\frac{3}{16}$-inch	Internal diameter, per foot, ...	12 cents
$\frac{5}{16}$-inch	(scant) Internal diameter, per foot, ...	20 cents
⅜-inch	Internal diameter, per foot, ...	23 cents
⅝-inch	(scant) Internal diameter, per foot, ...	35 cents
¼-inch	Internal diameter, $\frac{1}{16}$-inch wall, per foot, ...	15 cents

FOOT-BLOWERS.

FLETCHER FOOT-BLOWERS. These blowers are without a doubt the very best ever constructed for laboratory and workshop purposes. They are of excellent workmanship and constructed of the best material obtainable. We guarantee them to be as durable as any article of the kind ever made. They are made in two styles, viz.: No. 9 and No. 10. There are also three sizes of each style — the smallest being designated by its number as the No. 9 or No. 10; the medium size as the No. 9A or No. 10A, and the largest as No. 9B or No. 10B. A rubber disk forms the air reservoir and equalizes the pressure by its elasticity. By increasing the number of disks, a greater air pressure is obtained.



Style No. 9, 9A or 9B.

As formerly made, the No. 9 could not be used upon a dusty floor without picking up dust and lint, and thus choking the small tips used with some blowpipes. As now made, it can be operated anywhere, even upon a dust heap, and a blast of pure air obtained.

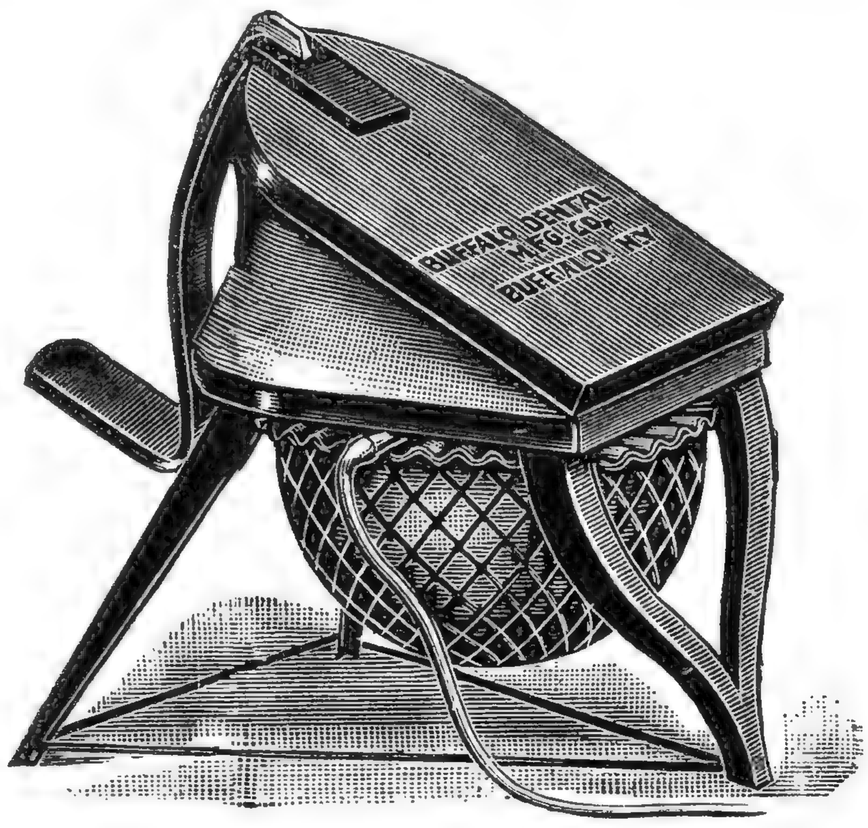
No. 10 is mounted upon legs, the blower being reversed, so as to bring the air reservoir below instead of above. This obviates the risk of injury to the rubber disk or its containing net, by dropping tools or corrosive liquids upon them.

For ordinary blowpipe work the No. 9 or No. 10 is best adapted. It is large enough to supply the requisite quantity of wind, and the pressure is as heavy as is desirable for the production of the small blue-pointed jet or reducing flame.

For larger blowpipes, or small melting furnaces, the No. 9A or No. 10A is employed. These have two disks, one superimposed upon the other, and give a greater quantity of wind at about one-half greater pressure than the smaller blowers.

For the largest blowpipes and melting furnaces up to a capacity of ten or twelve pounds of copper, the No. 9B or No. 10B is used. These are still larger and give a heavier wind pressure, three disks being used. Either of these will furnish a blast capable of burning 60 feet of gas or more per hour in a furnace, or upwards of one hundred feet per hour in a blowpipe.

No. 10B has detachable legs for convenience in packing and transporting.



Style No, 10. 10A or 10B.

The Fletcher Foot-Blower finds a place in every laboratory or workshop in which an air-blast is required, either for the blowpipe or for operating melting furnaces. It is simple, compact, portable and powerful, giving a steady blast of air at a pressure of from one to nearly two pounds to the square inch. The pedal by which it is operated is very low, allowing the operator to stand or sit, at pleasure.

The excellent reputation of the Fletcher Foot-Blowers has led to their imitation, so far as the outward shape is concerned. The *imitation* foot-blower is made of soft wood of insufficient density for retaining the screws that are used in the hinges and legs; the joint between the boards of the feeder and reservoir is not properly constructed, and is always in a leaky condition. In short, the imitation foot-blower is neither efficient nor desirable, and is a disgrace to any laboratory.

The name BUFFALO DENTAL MFG. CO., BUFFALO, N. Y. is stamped in the wood on each bellows made by the Buffalo Dental Manufacturing Co., also the date of manufacture.

TABLE OF SIZES AND CAPACITIES OF FOOT-BLOWERS.

	Size of boards	Diameter of air Reservoir	Pressure of blast per inch	Cubic Ft. of air per hour
No. 9 or 10 Foot-Blower,	7¾ x 9	7¼ in.	1 lb.	190
No. 9A or 10A Foot-Blower,	10 x 11	9 in.	1½ lb.	330
No. 9B or 10B Foot-Blower,	11½ x 13¾	11 in.	1¾ lb.	625

PRICES OF FOOT-BLOWERS.

No. 9 Foot-Blower, with single disk,	$5.00
No. 9A Foot-Blower, with double disk,	7.00
No. 9B Foot-Blower, with three disks,	11.50
No. 10 Foot-Blower, with single disk, on legs,	6.00
No. 10A Foot-Blower, with double disk, on legs,	8.00
No. 10B Foot-Blower, with three disks, on legs,	12.50
Extra Nets, each,	.35

"BUFFALO" RUBBER DISKS. FOR FOOT-BLOWERS. "Buffalo" Rubber Disks are cut from steam-cured sheet rubber, made of UP-RIVER Fine Para, the most expensive grade known, without the admixture of lower grades to cheapen the product. The stock contains absolutely no other ingredients, except the necessary sulphur to cure it. The rubber sheet is prepared according to the most approved methods employed in the manufacture of rubber goods for mechanical purposes, and no attempt is made to secure the velvety finish given to dental dam, as such finish is obtained by means of vapor or acid curing, both processes known to shorten the life and service of bellows disks. "BUFFALO" Rubber Disks are guaranteed perfect in every respect and have proved of excellent lasting quality under the most trying conditions.

PRICES:

No. 9. 9⅛-inch "Buffalo" Rubber Disks, each, ... $0.75

No. 9A 11½-inch "Buffalo" Rubber Disks, each, ... 1.15

No. 9B 14¼-inch "Buffalo" Rubber Disks, each, ... 1.65

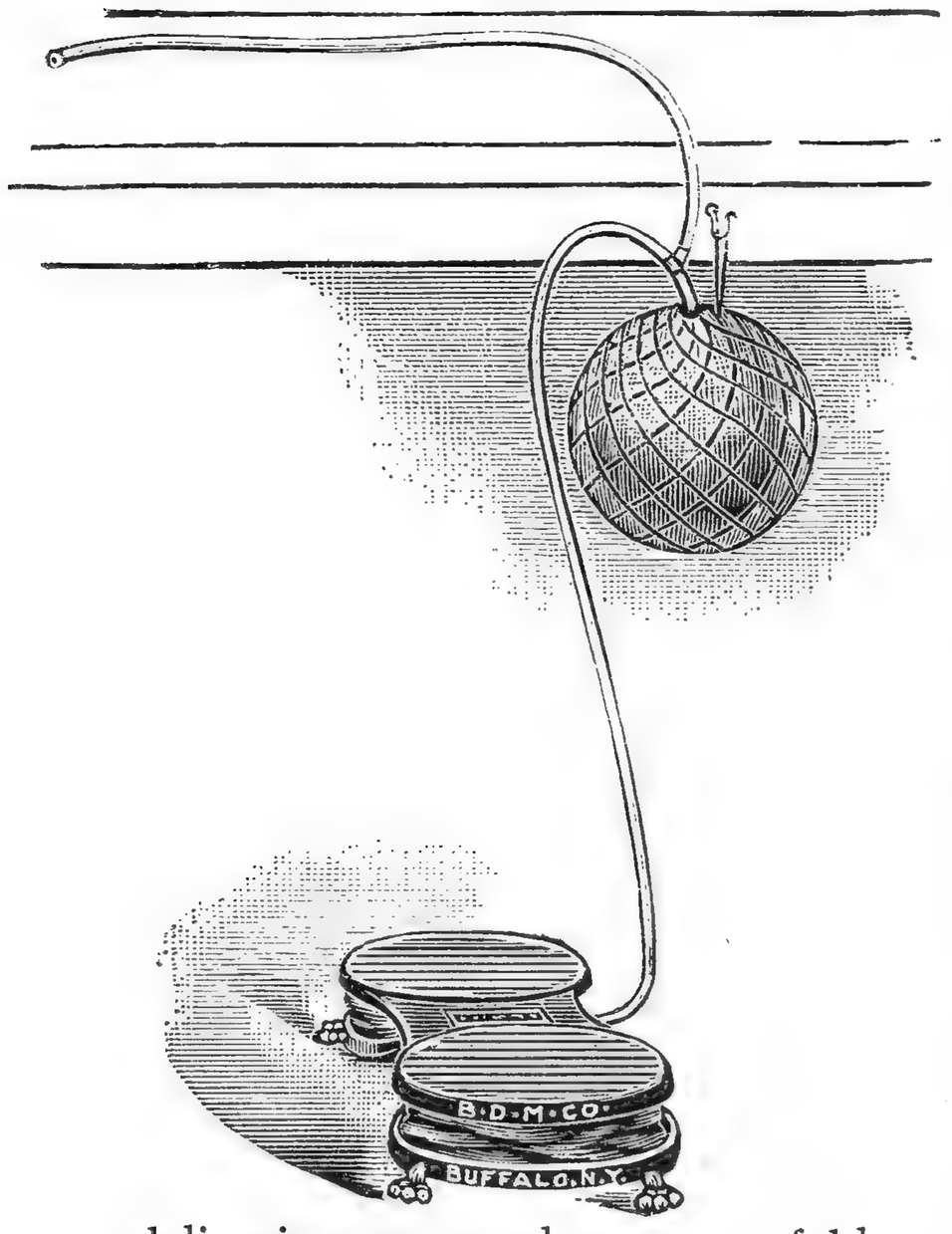
A prominent manufacturing Jeweler writes:

"In regard to your rubber disks, we wish to state, we have been using one of them for over a year, and it is just as good as ever, while other makes we have used were not worth the time fastening on. Whenever we need new disks, we know where to write for them."

Insist on having
"BUFFALO" RUBBER DISKS.



Each "Buffalo" Rubber Disk bears this imprint and date of sale.



No. 90. B. D. M. CO.'S DOUBLE-ACTION FOOT-BLOWER. This blower is a modification of the English pattern Foot-Blower, greatly improved in the process of manufacture.

It consists of a lower and upper cast-iron frame, hinged in the center, which gives it a double-acting movement. Between the frames are two air receivers, or bellows, which discharge into a valve-box underneath. The valve-box is connected with the reservoir by means of rubber tubing. Attached to the rubber bag, or reservoir, is a tee for connecting the blowpipe, by means of rubber tubing.

This blower will be found amply powerful for operating our No. 6F and other small blowpipes, also the No. 45 Gasoline Gas Generator and Blowpipe, and for all light soldering purposes. It is especially desirable for use in wood burning in place of the hand or foot bulb ordinarily employed, as it leaves both hands free for the work, and furnishes a continuous blast of air of ample volume. The reciprocating movement being so slight, it is much less fatiguing than almost any other pattern of blower delivering an equal amount of blast. This blower is of the very best workmanship and material, and made on our own premises. It is "Buffalo Quality" all through.

The price includes bellows, bag or reservoir, 5 feet of tubing and connecting tee as shown in illustration.

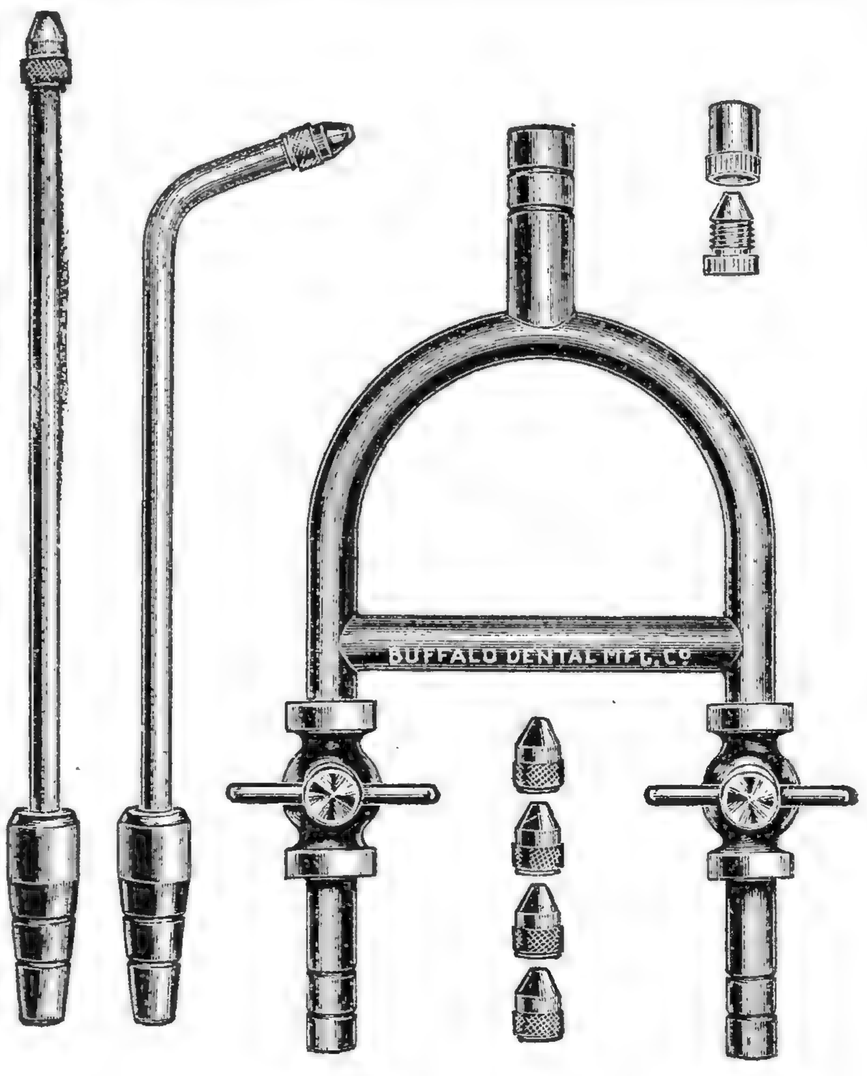
PRICES:

No. 90 B. D. M. Co.'s Double-Action Blower, complete,			$5.50
Bellows alone,			3.50
Bag,	1.25	Net,	.35
¼-inch Tubing, per foot,	.15	No. 119A Tee,	.30

LEAD BURNING. In the use of a non-oxidizing flame for lead burning, we have constructed a special burner for the proper mixing of oxygen and hydrogen gases, consisting of two burner shafts, with six jets and a yoke, which is provided with convenient taps for regulating the flow of these gases to the burner tip, to produce perfect combustion. Safety gauzes are inserted in the yoke, to prevent flashing back of the flame.

Either of the burner shafts, as the case may require, is connected to the yoke by means of rubber tubing, and the set of six jets with varying orifices (drilled Nos. 47, 52, 57, 60, 64 and 68) is supplied to produce any size flame from a fine needle point to a large brush flame. By providing both a straight shaft and a curved shaft, every requirement of a lead burner is met. A wind shield is provided for use on all jets.

This burner is substantially built, all parts being of brass. The price includes 5 feet of extra heavy pure antimony rubber tubing $\frac{5}{16}$" diameter, to connect the burner shaft to the yoke. Cut half size.

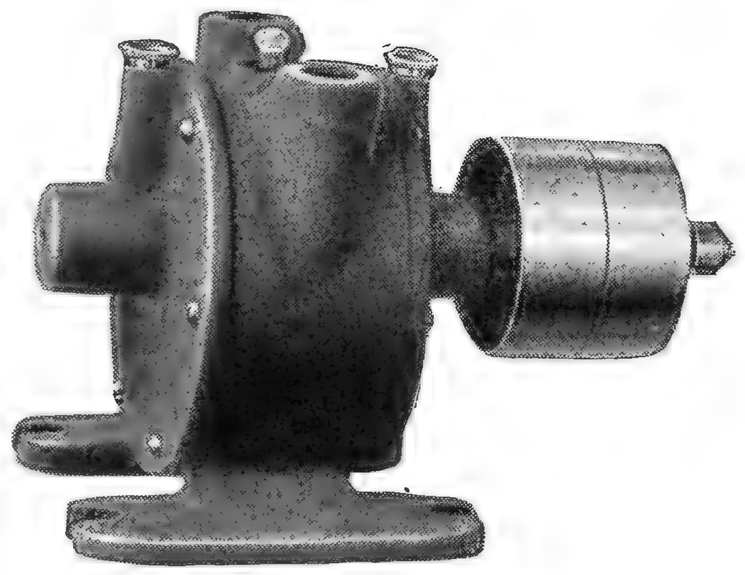


PRICES:

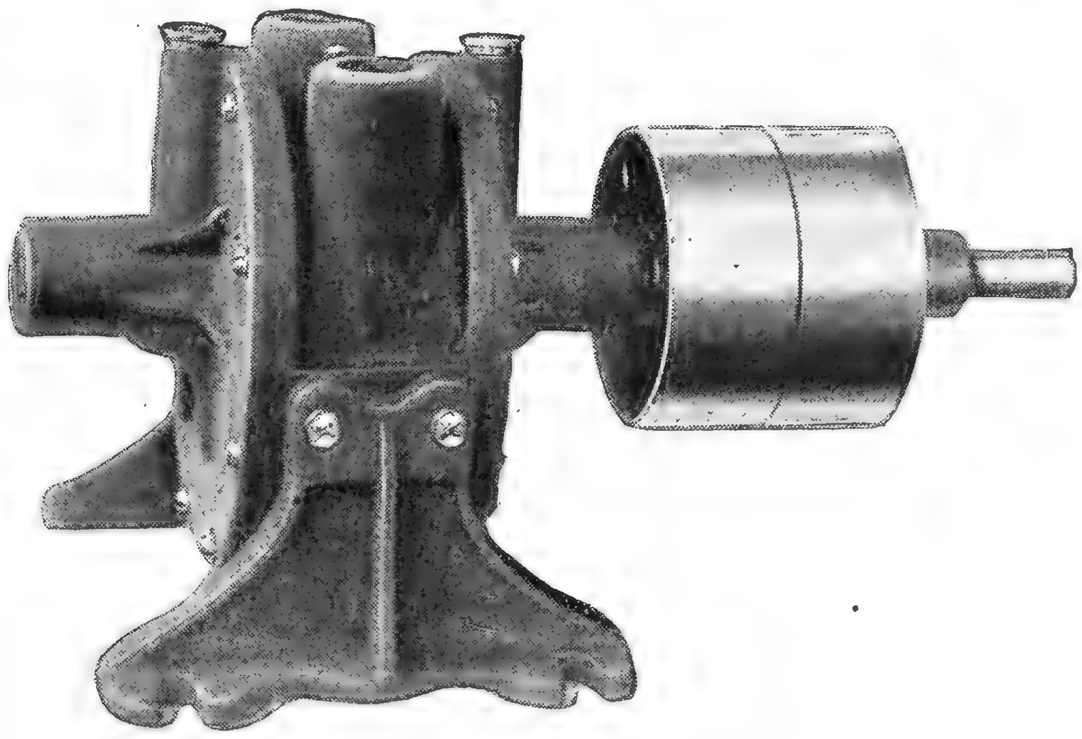
No. 28. Oxy-Hydrogen Lead Burner,	$7.00
Extra $\frac{5}{16}$-inch Antimony Rubber Tubing, per foot,	.20
Extra Burner Tips, each,	.15
Extra Wind Shield, each,	.15

POWER BLOWERS.

CROWELL POSITIVE PRESSURE BLOWERS. Types "A" and "B". These Positive Pressure Blowers or Rotary Air Pumps are, within their volume capacity ratings, adapted to all purposes requiring air under pressure of from one to ten pounds to the square inch, or for any degree of vacuum not exceeding twenty-four inches. The principle of construction is identical in both types—i. e., an internal drum and shaft carrying the sliding blades or pistons which operate in close contact with cylinder wall. NO SPRINGS, GEARS, VALVES, OR UNBALANCED PARTS. The action is very simple but positive even at the lowest speed. Pressure is not dependent upon high speeds or centrifugal force.



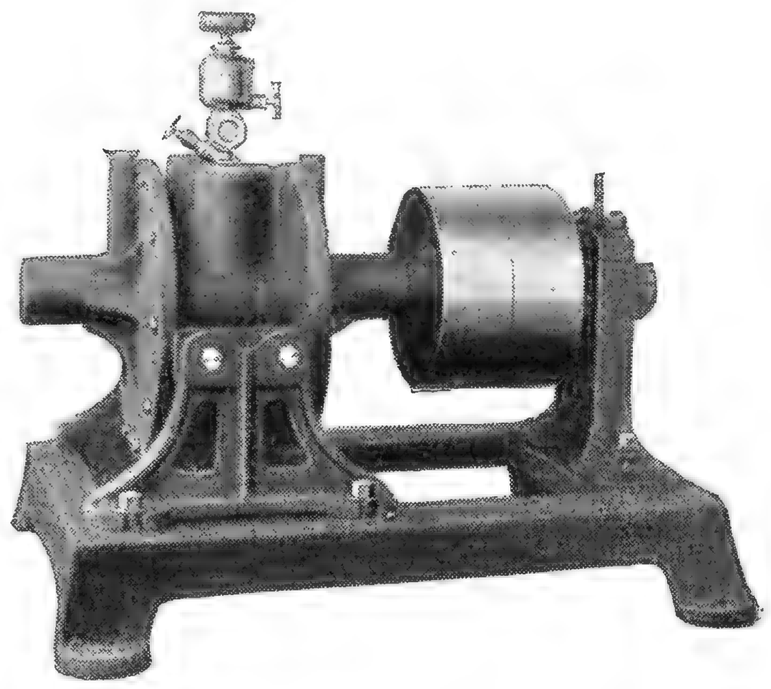
TYPE A. Sizes 1 and 2



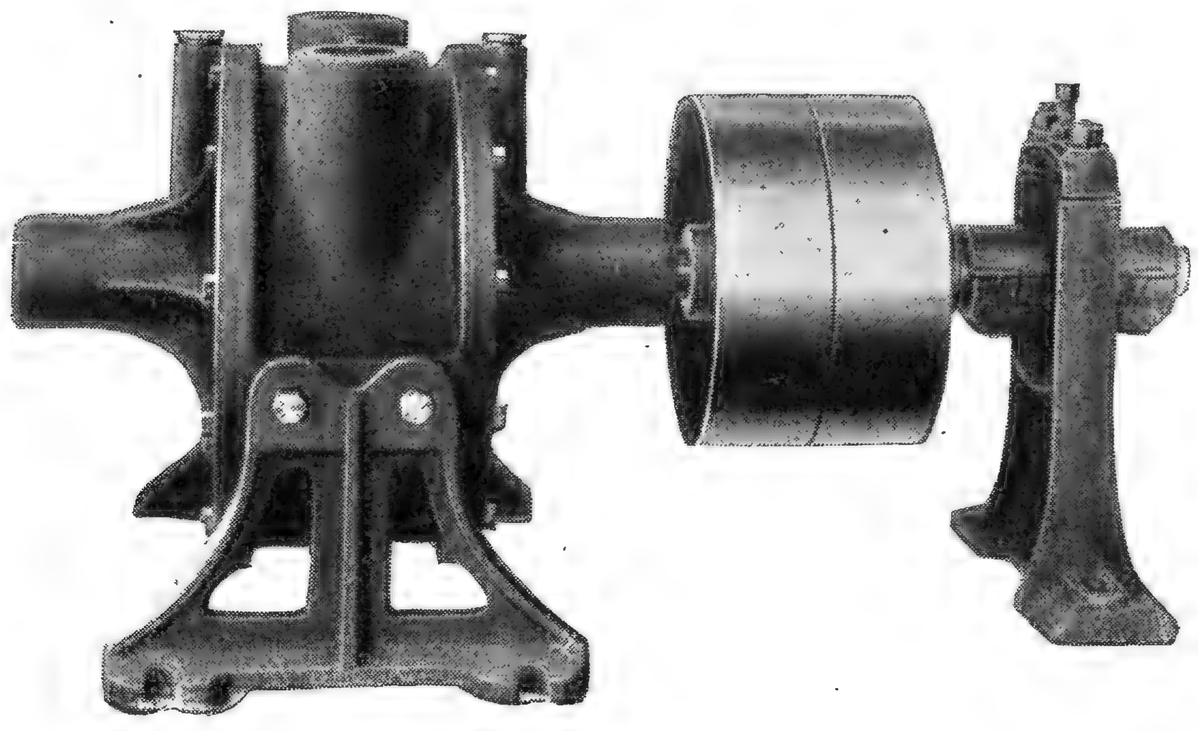
TYPE A. Sizes 3 and 4.

AIR PIPES. The size of the air pipe to convey the air should be as large as the openings in each sized blower. It is of great importance in all Blowers that the conducting pipes should not only be of suitable size, but should be free from elbows or turns as much as possible, as all tend to resist the passage of air and create friction, thereby making it necessary to increase the power to force the air around short turns or through small passages of piping, and this increase of friction is both unnecessary and expensive.

THE TYPE "A" BLOWERS are of the same volume and pressure capacities as the Type "B".



TYPE "B". With Base Plate and end bearing for shaft.



TYPE A. Sizes No. 5 and larger.

TYPE "B" BLOWERS. For hard steady service under high pressures the type "B" Blowers, on account of the additional weight and strength imparted by the base plate and end bearing for shaft, are extremely rigid and therefore usually preferable.

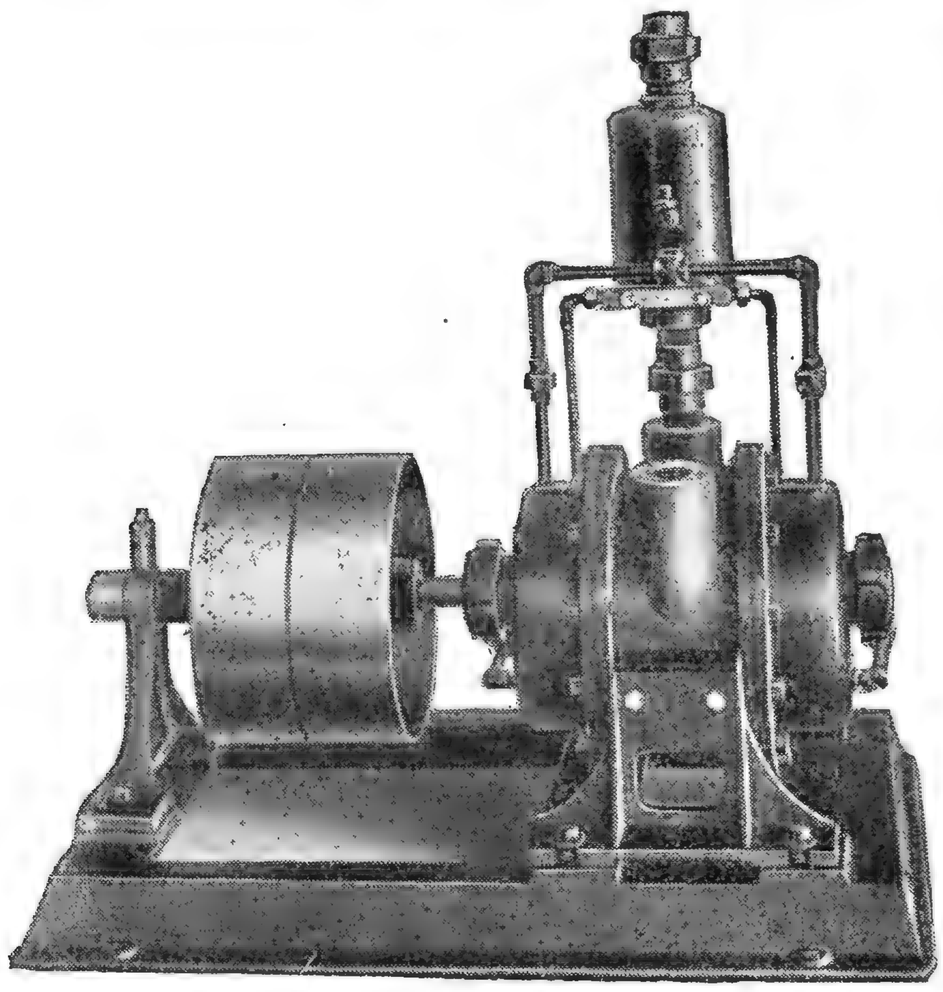
DETAILS OF CROWELL TYPE "A" BLOWERS

Size No.	Free Air Capacity: Cubic Inches per Rev.	Free Air Capacity: Cubic Feet per Minute at Maximum Speed	Revolutions per Minute Maximum Speed	Horse Power Approximate at 3 Pounds Pressure	Pulleys Inches	Net Weight Pounds	Pipe Size, Inlet and Outlet	Floor Space Inches	List Price Type A
1-A	20	6.9	600	$\frac{1}{8}$	4 x 1	24	$\frac{1}{2}$″	10 x 6$\frac{1}{4}$	$ 20.00
2-A	45	13.	500	$\frac{1}{4}$	4 x 1$\frac{1}{2}$	34	$\frac{3}{4}$″	12$\frac{1}{2}$ x 6$\frac{1}{2}$	26.00
3-A	125	25.3	350	$\frac{1}{2}$	6 x 2$\frac{1}{2}$	90	1″	22 x 14	40.00
4-A	280	40.5	250	1	9 x 3	170	1$\frac{1}{2}$″	28 x 17	50.00
5-A	460	53.2	200	1$\frac{1}{2}$	10 x 3	225	2″	34 x 20	75.00
6-A	690	79.8	200	2	12 x 4	320	2″	38 x 20	100.00
8-A	1050	121.5	200	3$\frac{1}{2}$	14 x 6	575	2$\frac{1}{2}$″	48 x 22	150.00
10-A	1660	192.	200	5	18 x 6	770	3″	54 x 28	225.00
12-A	3390	392.3	200	7	20 x 6	1300	4″	60 x 31	390.00

DETAILS OF CROWELL TYPE "B" BLOWERS

Size No.	Free Air Capacity: Cubic Inches per Rev.	Free Air Capacity: Cubic Feet per Minute at Maximum Speed	Revolutions per Minute Maximum Speed	Horse Power Approximate at 3 Pounds Pressure	Pulleys Inches	Net Weight Pounds	Pipe Size, Inlet and Outlet	Floor Space Inches	List Price Type B
1-B	20	6.9	600	$\frac{1}{8}$	4 x 1	42	$\frac{1}{2}$″	14 x 10	$ 28.00
2-B	45	13.	500	$\frac{1}{4}$	4 x 1$\frac{1}{2}$	55	$\frac{3}{4}$″	16 x 11	35.00
3-B	125	25.3	350	$\frac{1}{2}$	6 x 2$\frac{1}{2}$	145	1″	25 x 20	50.00
4-B	280	40.5	250	1	9 x 3	240	1$\frac{1}{2}$″	30 x 23	60.00
5-B	460	53.2	200	1$\frac{1}{2}$	10 x 3	330	2″	37 x 25	95.00
6-B	690	79.8	200	2	12 x 4	570	2″	41 x 25	125.00
8-B	1050	121.5	200	3$\frac{1}{2}$	14 x 6	790	2$\frac{1}{2}$″	50 x 27	185.00
10-B	1660	192.	200	5	18 x 6	1050	3″	56 x 33	270.00
12-B	3390	392.3	200	7	20 x 6	1770	4″	62 x 36	445.00

CROWELL'S ROTARY COMPRESSOR OR VACUUM PUMP. TYPE "D." The Crowell Type "D" Rotary Air Compressors are manufactured in nine standard sizes of from four to three hundred and ninety cubic feet free air per minute capacities and are designed for a working pressure of twenty-five pounds or less to the square inch. When used as Vacuum Pumps, all sizes of this type will, under permissible atmospheric conditions, exhaust to a vacuum of from twenty-nine to thirty inches (mercury column). The action is simple, positive and durable with a continuous intake and delivery of the air. No valves, springs, gears or unbalanced parts are used or required in the construction. The pressure or degree of vacuum is not dependent upon high operating speeds and as no special foundation or great amount of floor



space is required, the installation and operation is a comparatively simple matter. The Crowell system of lubrication as applied to all standard Type "D" sizes, is positive and automatically controlled by the air pressure or vacuum. The oil feed valves are adjustable to suit the grade of lubricant used, and can be closed entirely when necessary. Rotates in one direction only either for use as a Compressor or a Vacuum Pump, requiring no changes in the lubricating system which operates from the outlet or pressure side under either compression or vacuum. Connections should be made to the inlet or suction side for vacuum work and it is also advisable, when using as a compressor, to run a pipe from the inlet to such place where a clean supply of air is assured. The heads are provided with water jackets for cooling, when necessary. The flow of water is regulated by the valve which is fitted to the overflow or discharge pipe. "Crowell Rotaries" are also made in other types, special sizes, etc., for lower pressures or vacuums as well as for higher pressures up to 125 lbs. to square inch, or practically absolute vacuums. Plain or automatically controlled motor driven outfits supplied in all types.

DETAILS OF CROWELL TYPE "D" COMPRESSORS OR VACUUM PUMPS

Size No.	Free Air Capacity: Cubic Inches per Revolution	Free Air Capacity: Cubic Feet per Minute at Maximum Speed	Maximum Speed Revolutions per Minute	Approx. H. P. at 15 Pounds Pressure or 29 Inches of Vacuum	Pulleys Tight and Loose Inches	Approximate Net Weight Pounds	Pipe Size, Inlet and Outlet	Floor Space Inches	List Price Type D
1-D	15	4.3	500	½	6 x 2	70	½″	13 x 18	$ 40.00
2-D	40	9.2	400	1	8 x 2	115	¾″	14 x 22	60.00
3-D	100	17.	300	2	12 x 4	250	1″	19 x 34	90.00
4-D	280	40.5	250	4	14 x 4	425	1½″	23 x 38	150.00
5-D	400	46.	200	5	18 x 6	580	2″	26 x 44	170.00
6-D	600	69.4	200	6½	18 x 8	725	2″	26 x 55	225.00
8-D	1000	115.7	200	9	20 x 8	1150	2½″	30 x 64	325.00
10-D	1650	190.9	200	12	22 x 10	1675	3″	36 x 70	500.00
12-D	3390	392.	200	20	24 x 10	2150	4″	38 x 75	850.00

NEW PRICE LIST FOR AIR RESERVOIR TO BE USED ON EITHER THE BLOWERS OR COMPRESSORS

Size No.	Dimensions Inches	Weight Pounds	Pipe Size, Inlet and Outlet	List Price Including Relief Valve	List Price Valve Only
1	12 x 8	15	½″	$ 8.00	$3.00
2	12 x 8	15	¾″	8.00	3.00
3	20 x 10	28	1″	10.00	3.00
4	24 x 10	32	1½″	12.00	3.00
5	24 x 12	35	2″	14.00	4.50
6	24 x 12	35	2″	14.00	4.50
8	32 x 14	58	2½″	18.00	4.50
10	48 x 16	85	3″	28.50	6.00
12	48 x 18	110	4″	33.50	6.00

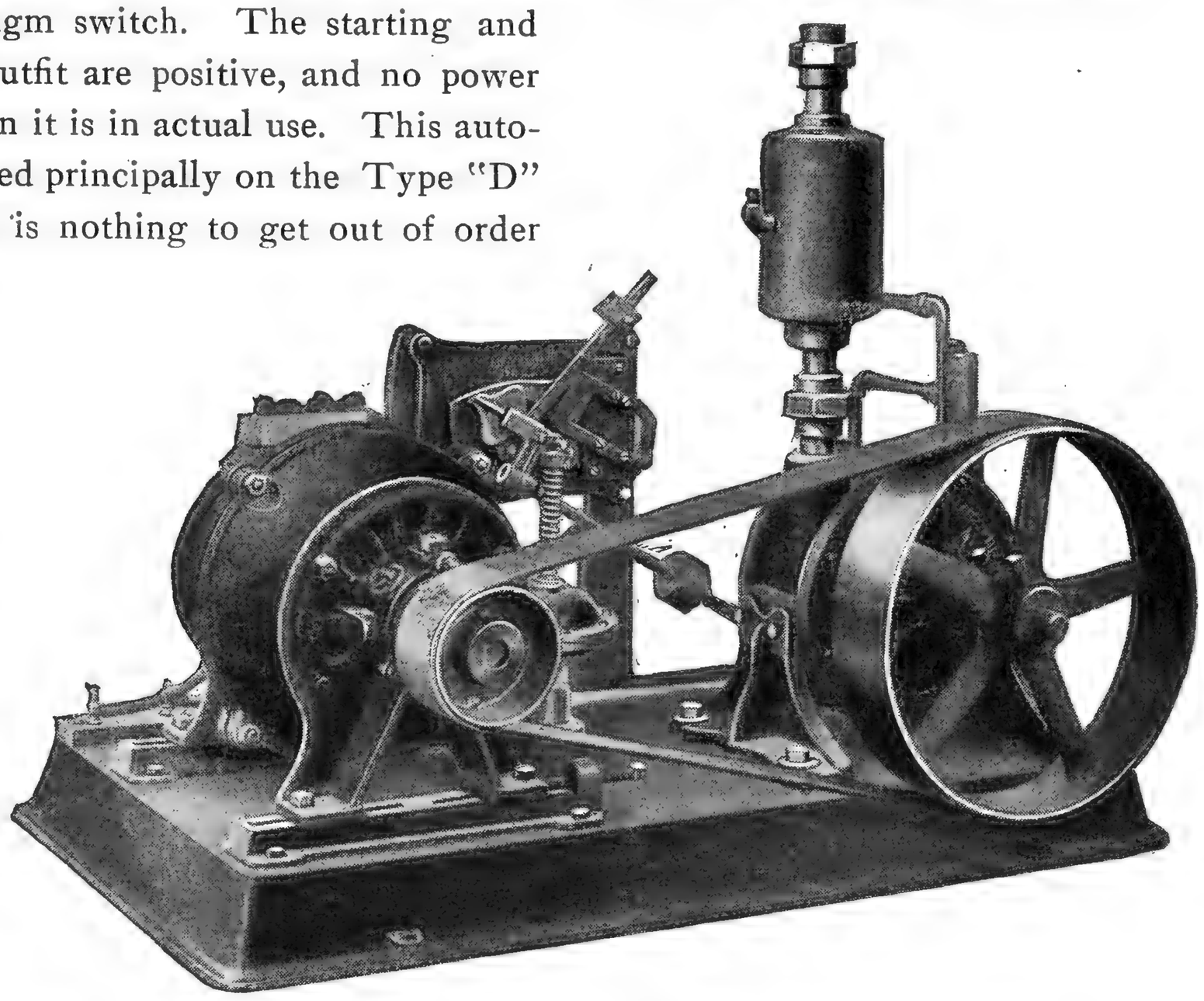
AIR RESERVOIR WITH RELIEF VALVE. The "Crowell" Pressure Blowers and Rotary Compressors may be used without the Air Reservoir for ordinary purposes, but when a steady pressure and well regulated delivery of air is required it is necessary to have the Reservoir, as by using same the air is delivered without perceptible vibration, and the valve on the Reservoir can be set to maintain any desired pressure, from one to ten pounds to square inch with the Blowers, or to twenty-five pounds with the Compressors.

If it is desired to supply the air for use at several different places, the Air Reservoir is of great advantage in maintaining an even pressure, and protecting the Pump from uneven or sudden strain.

Reservoirs are listed in sizes to correspond with the Blower or Compressor size numbers. The larger size Reservoirs can be fitted to any smaller size Compressor when required. See price list on preceding page.



Type "C" ROTARIES. The "Crowell" Blowers and Compressors or Vacuum Pumps when mounted on a base plate in connection with electric motor are designated as type "C." Illustration shows a Vacuum Pump with Sprague motor and automatic diaphragm switch. The starting and stopping of this outfit are positive, and no power is used except when it is in actual use. This automatic switch is used principally on the Type "D" Machines. There is nothing to get out of order and the operation is entirely automatic. It will start on one or two inches of vacuum, or the same in pounds pressure and stop when the desired vacuum or pressure has been reached according to the point at which the switch has been set.

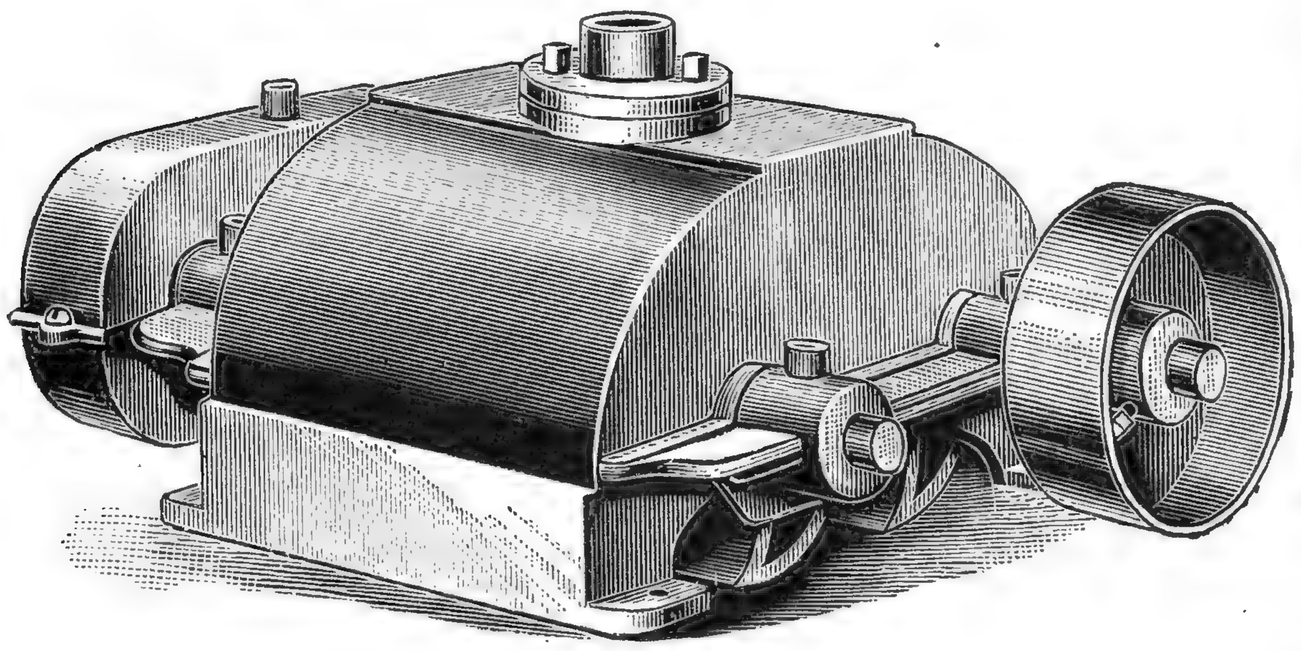


On account of the high speed of the standard motors it is impossible to connect them direct to the Blowers or Compressors, but the short belt drive makes it practically direct

connected, and if preferred, these outfits can be furnished with a gear or chain drive, and also without the automatic switch.

Prices will be furnished on receipt of specifications as to kind of outfit required, and also voltage and current available and full description of motor wanted.

ROOT'S POSITIVE PRESSUSE BLOWER. The revolvers are enclosed in an iron case, which is bored out perfectly true. The revolvers are of iron and are constructed on an entirely new principle, and are dressed so that they will keep up perfect and continuous contact with each other and the case during the entire revolution, thus forcing forward and utilizing all the air taken into the case. The shafting is steel of the best quality. The bearings are of anti-friction metal, arranged so that they can be easily renewed in a short time. The oiling arrangements are perfect. The gears are cut in the most accurate manner, and are inclosed in oil-tight housing and run constantly in oil, and the wear is reduced to the minimum. The blower is driven by power, and the speed is multiplied by cut gears. The different parts are all made to standard size, and any part may be duplicated. It is quite important that the journals and gears should be kept properly lubricated, and not be allowed to heat, wear, or cut, as all the friction and wear is confined to these two places alone. The speed at which the Blower should be run should not exceed 400 revolutions. Maximum pressure developed, 1 lb.



We recommend this Blower where a heavy blast is required and power is available, as the advantage of the Positive Blower, or the superiority of the positive blast over the non-positive fan blast is apparent. The Positive Blower is the only one that can be controlled to furnish the exact amount of air needed, and is the only one that can produce the conditions that are absolutely necessary to effect perfect combustion.

With a fan, however, the case is different; there is nothing positive in its operation, and the results can never be relied upon, as they are varied by every contingency that varies the resistance.

Size.	Capacity in Cubic Inches per Revolution.	Maximum Speed per Minute	Pulley Sizes in Inches	Floor Space in Inches	Outlet in Inches	Weight Net	Price	Discharge
$\frac{1}{4}$	144	400	4 x $1\frac{3}{4}$	10 x 15 x 7	$1\frac{1}{2}$	50 lbs.	$20.00	Top only
$3\frac{1}{2}$	325	350	8 x 2	10 x 14 x 18	2	98 "	40.00	Top or side
4	648	300	10 x 3	12 x 16 x 26	3	188 "	66.00	Top or side

HOT BLAST MOUTH BLOWPIPES.

No. 30. FLETCHER'S HOT BLAST MOUTH BLOWPIPE. SPECIALLY DESIGNED FOR JEWELERS, CHEMISTS, DENTISTS, ETC. This has nearly double the power of the old mouth blowpipe. Five patterns of this blowpipe are made as specified below.

PRICES:

No. 30. Taper Shaft, brass, . $0.65



No. 30.

No. 30A. Straight Shaft brass, . .55



No. 30A.

No. 30B. Straight Shaft, brass, with hard rubber mouthpiece, .75



No. 30B.

No. 30C. Jointed, with both hot and cold blast jets, ... 1.00

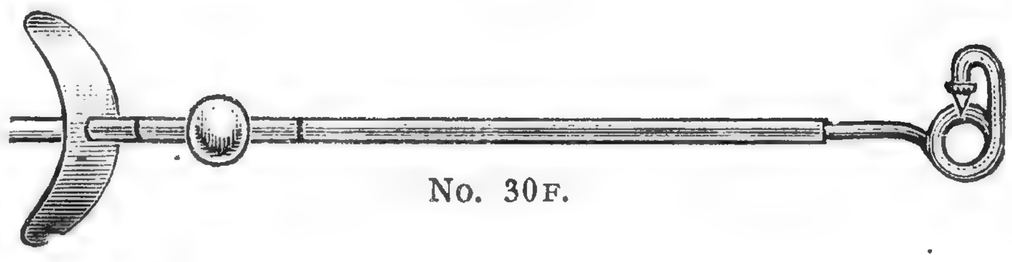


No. 30C.

No. 30F. With Moisture Bulb, and Metal Mouthpiece, nickel plated, ... 1.60

(Suggested by Professor W. W. Andrews.)

Hard Rubber Mouthpiece, separately, ...20

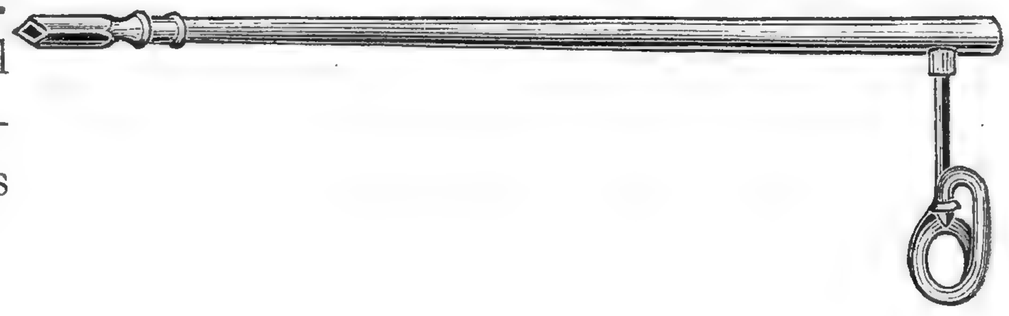


No. 30F.

No. 31. FLETCHER'S HOT BLAST CHEMICAL BLOWPIPE. A pattern of the ordinary chemical Blowpipe with the hot blast arrangement. Hard rubber mouthpiece. Jets No. 65 size, unless otherwise ordered.

PRICE.

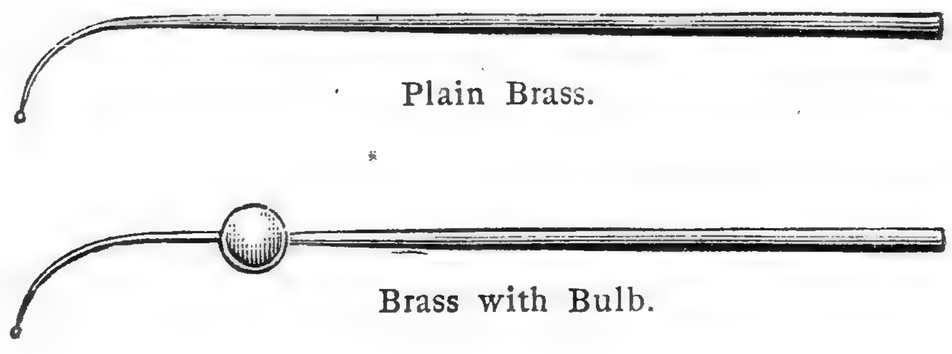
No. 31. Chemical Blowpipe. $1.25



MOUTH BLOWPIPES.

ORDINARY MOUTH BLOWPIPES.

Length.	Plain Brass	Brass, with Bulb.
9 inch, . .	12 cents, . .	24 cents
10 inch, . .	13 cents, . .	26 cents
11 inch, . .	14 cents, . .	28 cents
12 inch, . .	15 cents, . .	30 cents
13 inch, . .	16 cents, . .	32 cents

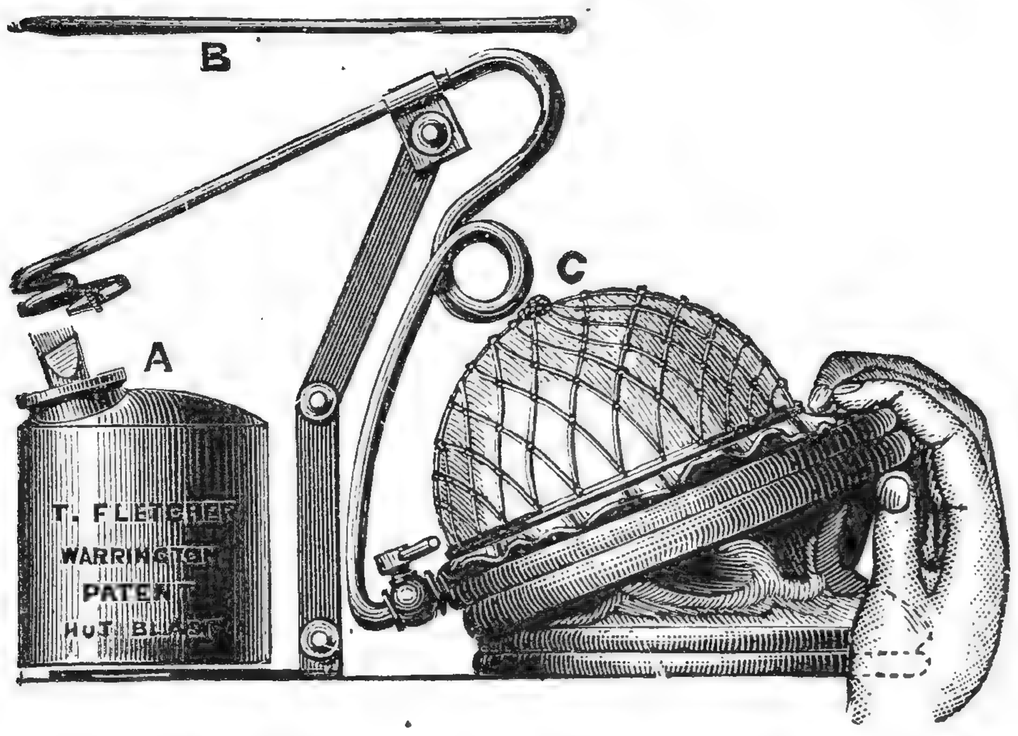


Plain Brass.

Brass with Bulb.

SPECIAL CHEMICAL BLOWPIPES.

Nos. 32 & 32A. FLETCHER'S SPECIAL CHEMICAL BLOWPIPES. With folding stand adjustable at any height or angle. It can be used either with the mouth, or the small hand-blower can be attached and the blowing done by pressure of the fingers. With this blowpipe is supplied one jet with, and one jet without the hot blast coil, to enable a large variety of flame to be obtained. The lamp or a weight should be placed on the stand when in use.



No. 32A.

PRICES:

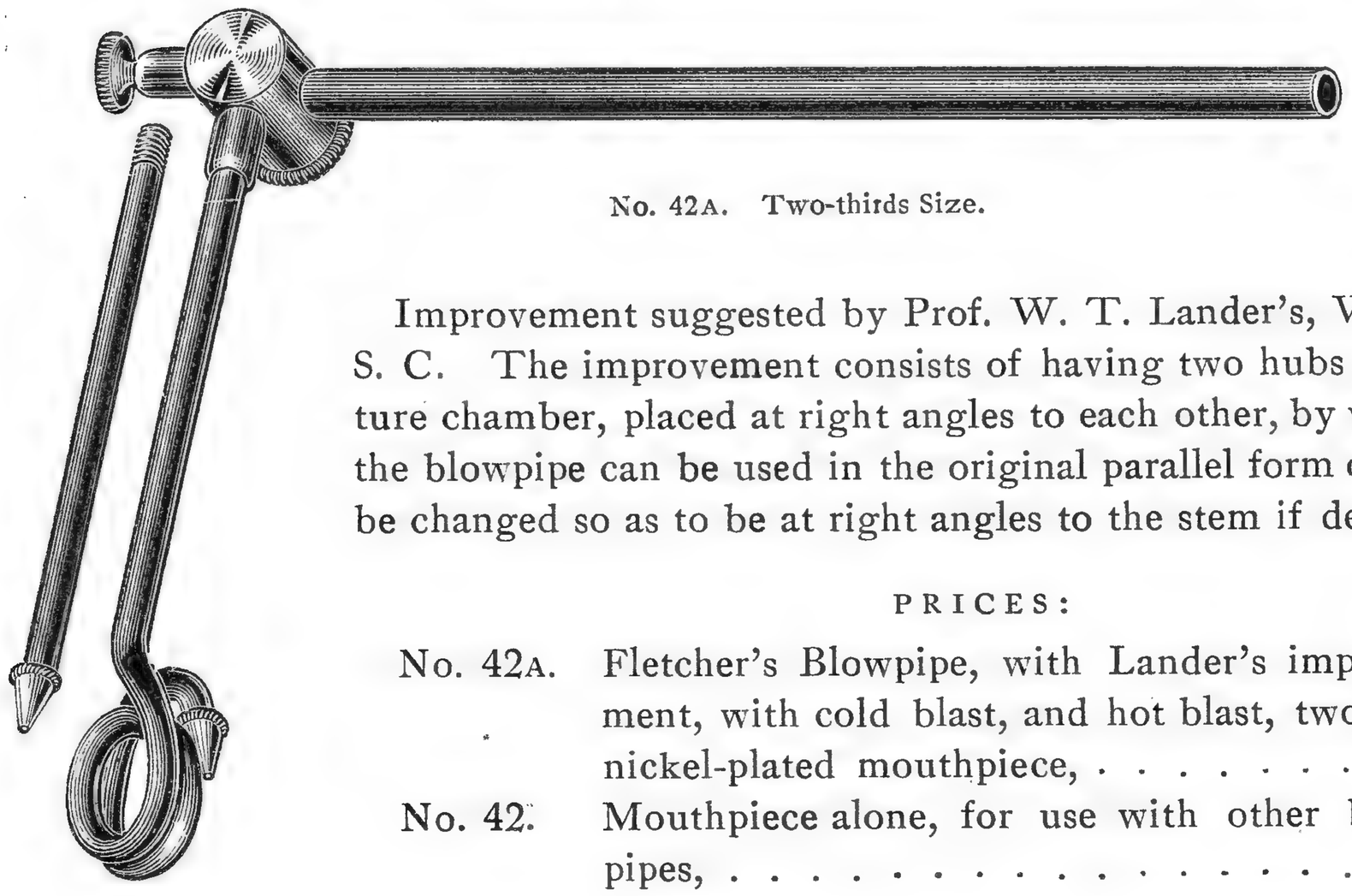
No. 32.	Blowpipe, alone,	$1.00
No. 32A.	Complete, as illustrated,	5.00
No. 32B.	As illustrated, but without lamp, in case for the pocket,	4.00

No. 9½. HAND-BLOWER, AS SHOWN IN No. 32A. This is a small copy of the foot-blower which is now so well known. When not in use it shuts up flat for the pocket. The pressure of air is adjusted by a delicate lever tap on the air tube. This will be found a great improvement on the mouth for blowing. A steady blast can be kept up for any length of time by pressure of the fingers, or by squeezing in the hand. Size of No. 9½ Hand-Blower, 4 x 4½ in.

PRICES:

No. 9½.	Hand-Blower, in case for travelers,	$3.25
	Extra rubber disks, each,	.15

No. 42A. FLETCHER'S BLOWPIPE.



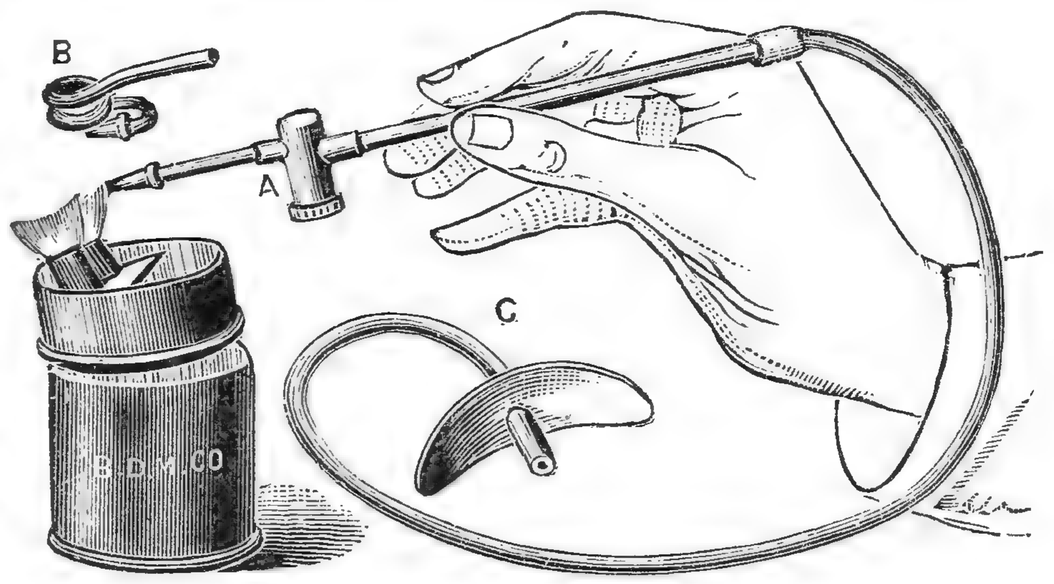
No. 42A. Two-thirds Size.

Improvement suggested by Prof. W. T. Lander's, Williamston, S. C. The improvement consists of having two hubs on the moisture chamber, placed at right angles to each other, by which means the blowpipe can be used in the original parallel form or the jet can be changed so as to be at right angles to the stem if desired.

PRICES:

No. 42A.	Fletcher's Blowpipe, with Lander's improvement, with cold blast, and hot blast, two jets, nickel-plated mouthpiece,	$1.75
No. 42.	Mouthpiece alone, for use with other blowpipes,	.60

No. 42. FLETCHER'S BLOWPIPE. The arrangement of the Fletcher Blowpipe (No. 42) is totally different from that of any other made. The ordinary form has been entirely discarded, and every detail has been specially designed from practical experience as to the requirements of users. The mouthpiece is, of all, the easiest to use, and the heaviest continued blowing causes no strain on the lips, whilst the tongue has the necessary control over the opening. The blowpipe proper is held as a pencil. The chamber on the stem stops all condensed moisture, and prevents the heat traveling up the shaft.



PRICE:

No. 42. Fletcher's Blowpipe, with cold blast and hot blast, two jets, nickel-plated mouthpiece, ... $1.50

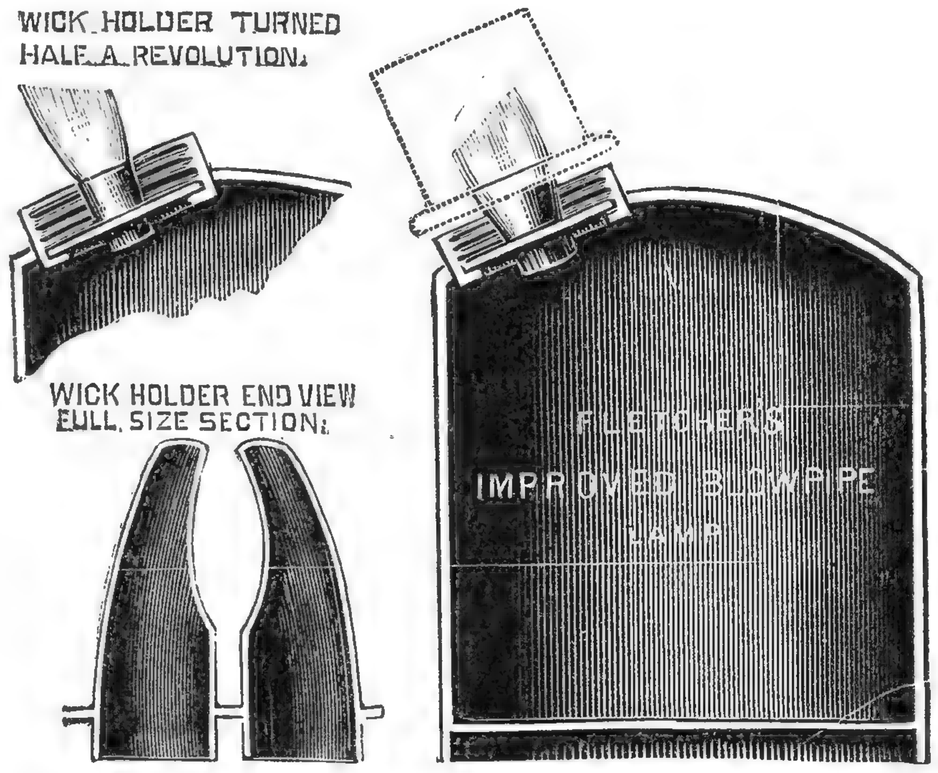
BLOWPIPE LAMPS.

No. 125. FLETCHER'S IMPROVED BLOWPIPE LAMP.

For Sperm Oil.—The wick holder lifts out for refilling. Its angle can be adjusted as required by simply revolving it in the fixed collar. Lamp engraved half size.

PRICES:

No. 125. Blowpipe Lamp polished, Brass, ... $1.00
No. 125A. Blowpipe Lamp, nickel-plated, ... 1.20



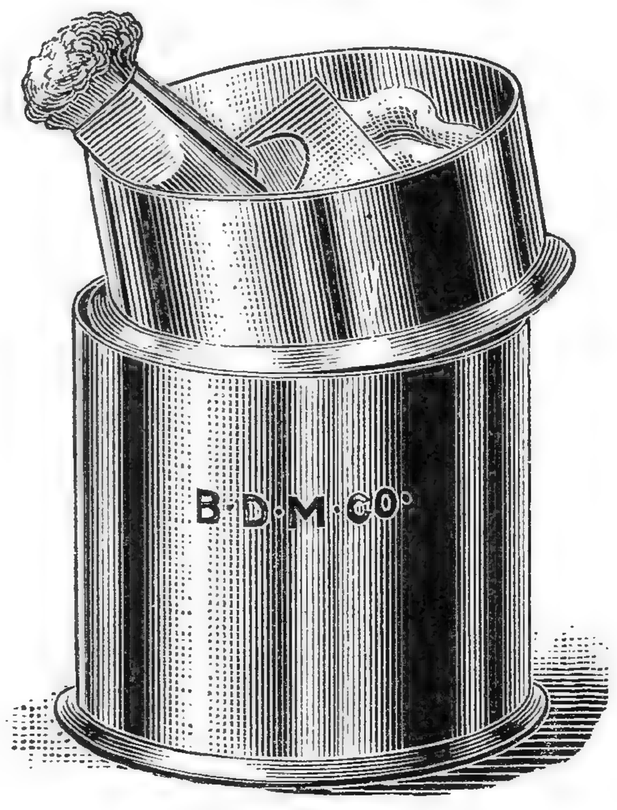
No. 125.

No. 125B. BLOWPIPE LAMP FOR TALLOW.

A modified form of No. 125. For tallow or solid fats. When used, the tallow must first be melted by blowing the flame upon it. This pattern can be used with solid or liquid fats of any kind, and is a perfect traveler's lamp. Size when closed 2 x 2 inches. Trim the wick always while the lamp is hot, when hard fats are used. The curved bottom of the lamp should stand on the open end of the cover when in use. This makes a steady base and admits of adjustment of the angle of wick without reversing or retrimming.

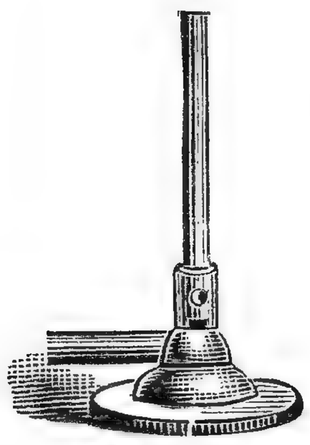
PRICE:

No. 125B. Blowpipe Lamp, for tallow, tin, 30 cts.



No. 125B.

BUNSEN BURNERS.

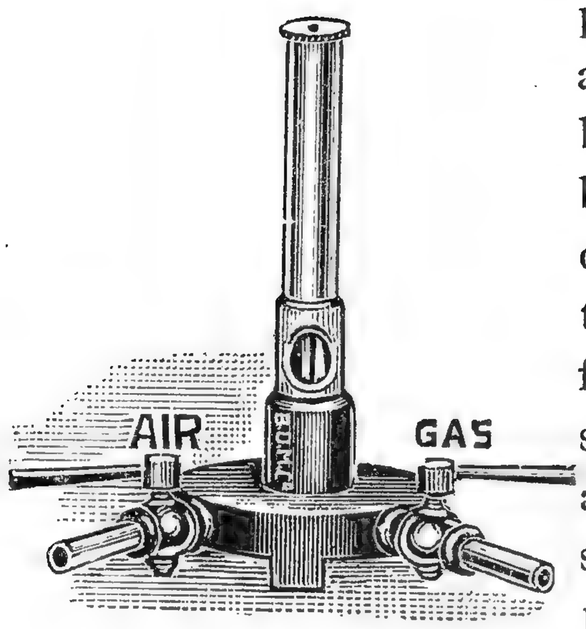


No. 2½.

No. 2½. BUNSEN BURNER. This burner is constructed wholly of brass and nicely adjusted. The flame is as near perfect as can be, and for chemical laboratory use is preferred to any of the cheap Bunsens. The admission of air is controlled by a sleeve, which can be turned to entirely exclude the air. The inside diameter of the burner is $\frac{5}{16}$-inch; height, 5 inches. Gas consumption about 3 feet per hour. For illuminating gas or natural gas.

PRICE:

No. 2½ Brass Bunsen, ... $1.25

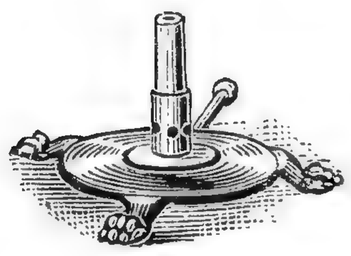


No. 5

No. 5. FLETCHER'S BLAST BUNSEN. For high temperatures. This is a Bunsen combined with a powerful blowpipe, and is one of the most generally useful arrangements known for the chemical laboratory. The blowpipe flame obtained with the blast tube, when confined by the loose cap B, is compact and extremely powerful, owing to the fact that the air mixture is partially made before the blast begins to act. When the object to be heated is fragile, it can be warmed by the Bunsen flame and the blast slowly turned on by the tap C. The convenience of having a powerful flame at command under an ordinary retort stand, without the necessity of readjusting the height or position, will be fully appreciated. For illuminating gas only. Total height, 6½ inches.

PRICE:

No. 5. Blast Bunsen Burner, ... $3.50



No. 5A.

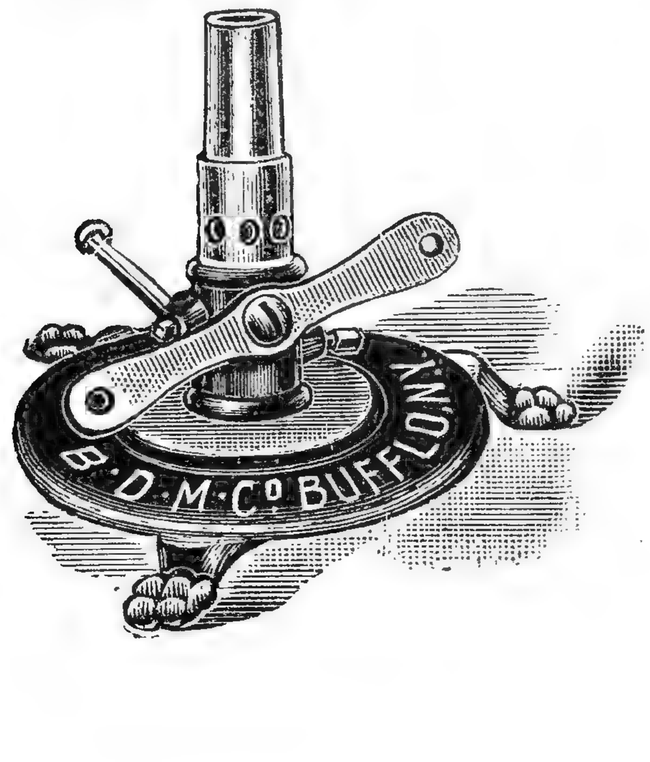


No. 5B, with Spider.

Nos. 5A and 5B. LABORATORY GAS BURNERS. For dentists, druggists and jewelers. This burner is an admirable substitute for the alcohol lamp. It will be found very convenient for general heating purposes. Total height, 2½ inches. For illuminating gas only.

PRICES:

No. 5A. Laboratory Gas Burner, ... $0.50
No. 5B. Laboratory Gas Burner, with Spider, . .75



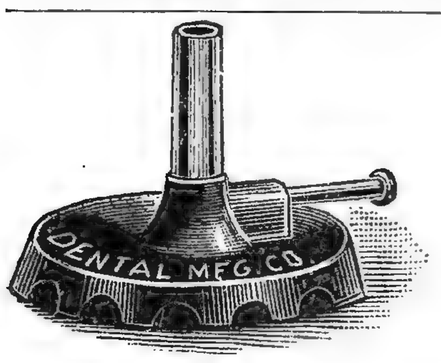
No. 5T. SELF-LIGHTING BUNSEN. A Bunsen with by-pass to keep the gas lighted when turned low.

A touch of the lever produces a full size flame or anything intermediate down to a small pilot flame. Saves gas and keeps a nice Bunsen flame of any size at instant command. For illuminating gas or natural gas. Specify when ordering.

(Improvement suggested by Dr. A. H. Waters.)

PRICE:

No. 5T. Self-Lighting Bunsen, . . . $0.75



No. 5N.

No. 5N. BUNSEN BURNER. An efficient Bunsen for various laboratory uses. The burner tube is open at the bottom, avoiding the danger of clogging the gas orifice. It has a substantial japanned iron base.

Height 2⅝ inches.

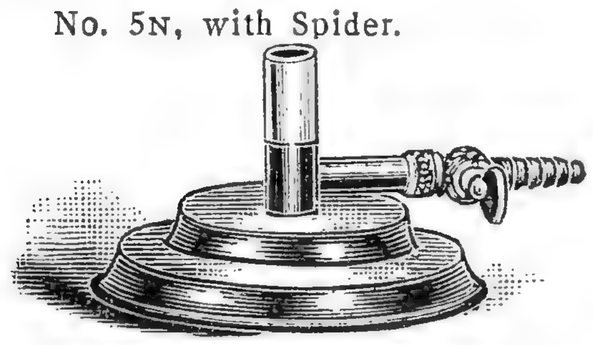
For illuminating or natural gas.

PRICES:

No. 5N. Bunsen Burner, ... 25 cents
No. 5N. Bunsen Burner with Spider, . 50 cents



No. 5N, with Spider.



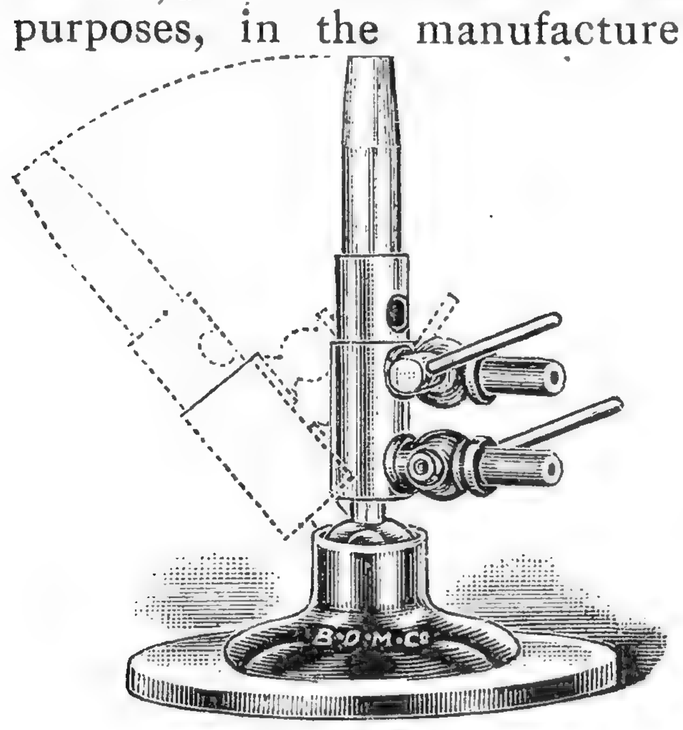
No. 5s.

No. 5S. GASOLINE GAS BURNER. If you use Gasoline Gas, you will want the No. 5s Gasoline Gas Bunsen, which is as efficient in its way as the B. D. M. Co.'s Gasoline Gas Blowpipe. It can be used for general heating and for light soldering, is readily regulated and gives a pure intense Bunsen flame.

PRICE:

No. 5s. Gasoline Gas, Burner $1.50

DR. J. LOWE YOUNG'S No. 5½ BURNER AND BLOWPIPE. The No. 5½ is a combined Bunsen Burner and Blowpipe intended for fine soldering purposes, in the manufacture of articles which require delicate treatment. It is especially desirable for opticians in the repairing of spectacle frames, as the blowpipe flame can be controlled to give the finest needle point desired. In the repair of fine jewelry the availability of either a bunsen flame or a blowpipe flame ranging from a brush to a fine needle point, and adjustability from vertical to horizontal make the No. 5½ most desirable and efficient.



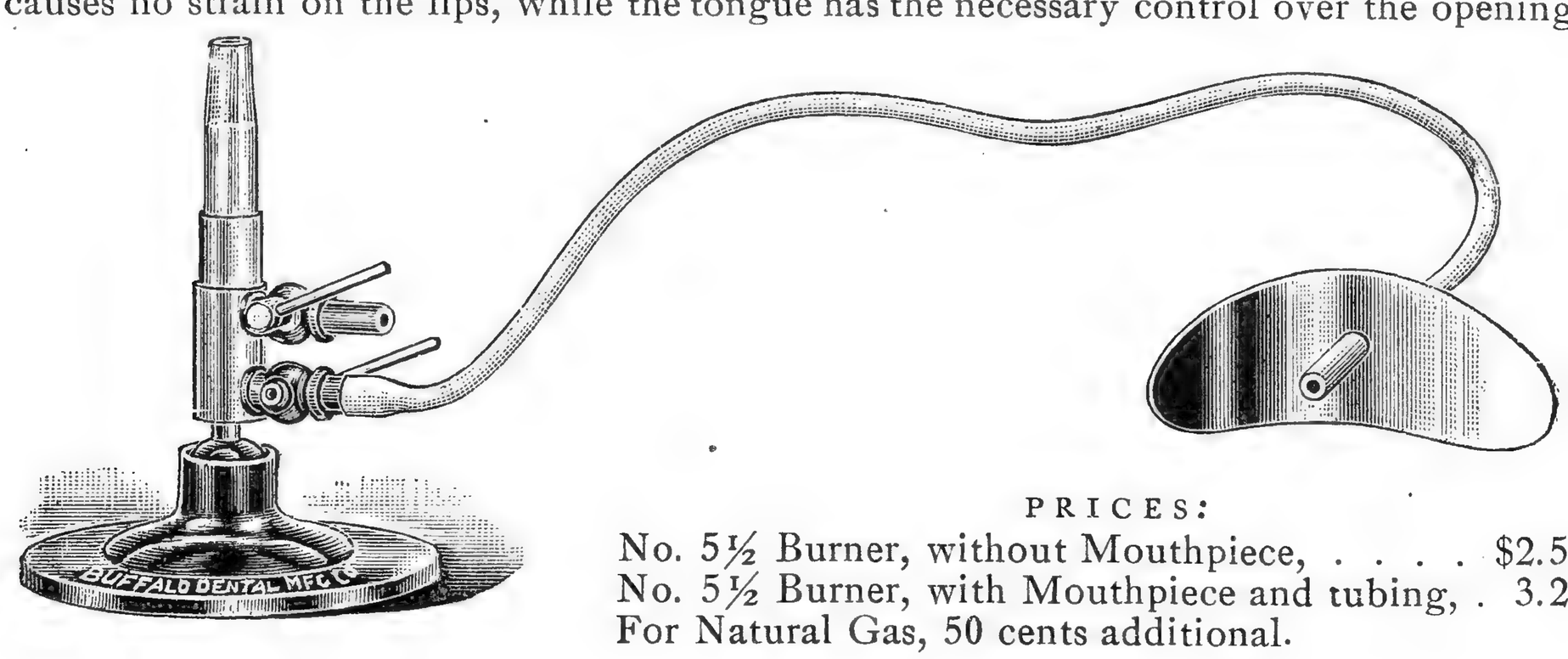
No. 5½.

It consists of a burner pillar in sections, having a ball at its lower end to enable it to swivel in the socket in the base in any direction desired, and from a vertical to a horizontal position.

The lower cock is for blast, while the upper is for the admission of gas. When desired to use as a blowpipe, the sleeve on the pillar is turned to close the openings, both cocks opened and air applied.

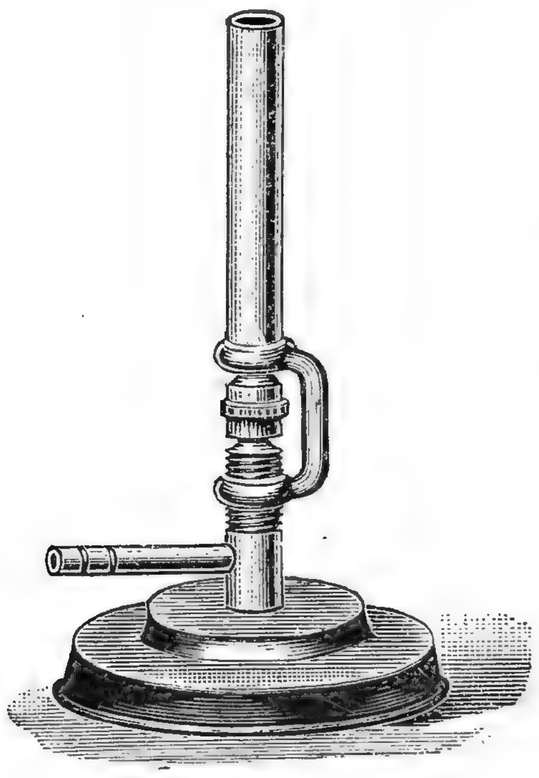
The air can be supplied by the mouth or from a small foot-blower. B. D. M. Co.'s No. 90 Double Action Foot-Blower is preferable.

The entire burner is polished and nickeled and is by far the handsomest and most efficient burner made for the purpose. The mouthpiece shown below (always extra) causes no strain on the lips, while the tongue has the necessary control over the opening.



PRICES:

No. 5½ Burner, without Mouthpiece, ... $2.50
No. 5½ Burner, with Mouthpiece and tubing, . 3.25
For Natural Gas, 50 cents additional.



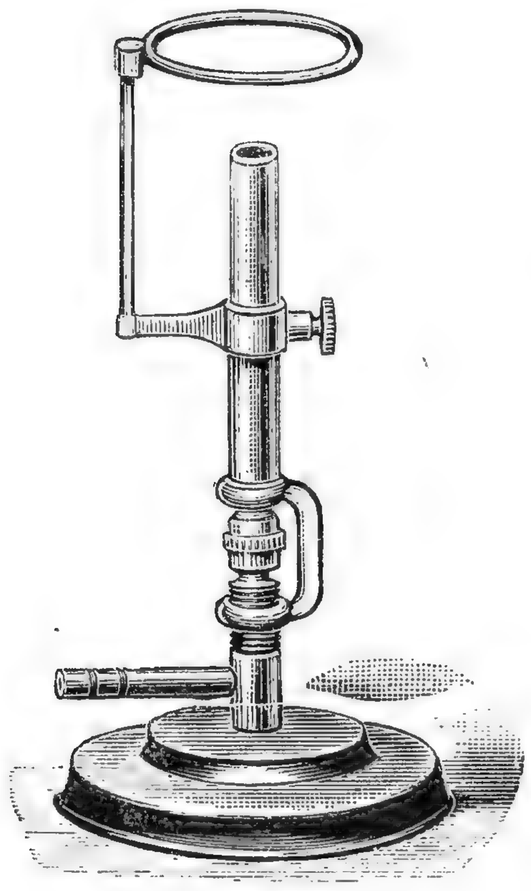
No. 5G.

No. 5G. ADJUSTABLE BUNSEN. For burning gasoline gas and other gases of variable quality. In this burner the size of the orifice through which the gas escapes is adjusted by turning the milled cap-nut seen inside the arm which supports the upright tube. The air supply is adjusted by screwing the arm up or down, it being threaded and moving upon the stem, which passes through its lower end. It follows that any desired quantity of flame can be produced with it, and that it will burn any kind or quality of gas, rich or poor.

Its adjustability renders it a favorite burner for those using gasoline gas, or the mixture of gasoline vapor and air made by gas machines.

It is well made and strong, and is mounted either upon a cast iron or brass base, as may be desired. Total height, 6½ inches.

This burner is furnished, when required, with an adjustable support for holding small flasks or evaporating dishes, or an iron plate for bluing small articles.



No. 5K.

PRICES:

No. 5G.	Adjustable Bunsen on iron base, .	$1.00
No. 5H.	Adjustable Bunsen on brass base, turned and polished, ...	2.00
No. 5K.	Adjustable Bunsen, iron base, with support, ...	1.75
No. 5K.	Support only, ...	.75

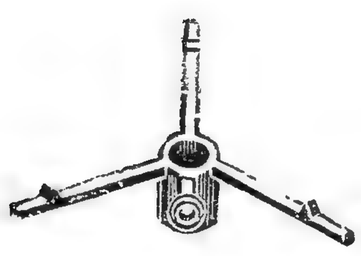


No. 50.

No. 50 SPIDER. Fits No. 5G Adjustable Bunsen. Iron, oxydized. With set screw.

PRICE:

No. 50 Spider, each, ... 25 cents



No. 51.

No. 51 CHIMNEY SUPPORTS. Brass, oxydized, with Set Screw. No. 51 takes 2-inch Chimney; fits No. 5G Burner; size of fit to burner tube, ½-inch.

No. 51A takes 3-inch Chimney; fits No. 5G Burner; size of fit to burner tube, ½-inch.

No. 51B takes 3-inch Chimney; fits $\frac{11}{16}$-inch burner tube.

PRICES:

Nos. 51, 51A, 51B Chimney Supports, each, ... 25 cents

70	65	60	55	50
•	•	•	•	•

BORE OF JETS. Stubs Steel Wire Gauge.

BLOWPIPE JET TIPS. For Nos. 4, 4A, and all hot blast mouth blowpipes. These jet tips screw on, and any size can be supplied.

PRICES:

Blowpipe Jet Tips, brass, each, ... 10 cents

FLETCHER'S SAFETY BUNSEN. Burners are frequently required for limited spaces where no side projection is possible. These will be found perfect in every detail, of the highest power possible for the size, can be turned down to the merest flicker without lighting back, and can be mounted on tubes in any form or number when very high powers are required. They are made in three sizes, all in brass. The gauze slides in, and in case of accident can be replaced in a few seconds. The number gives the maximum consumption in cubic feet per hour at $\frac{10}{10}$ pressure.

If a number are placed together, on a tube or ring, they must be at least one-fourth the diameter of the top apart.

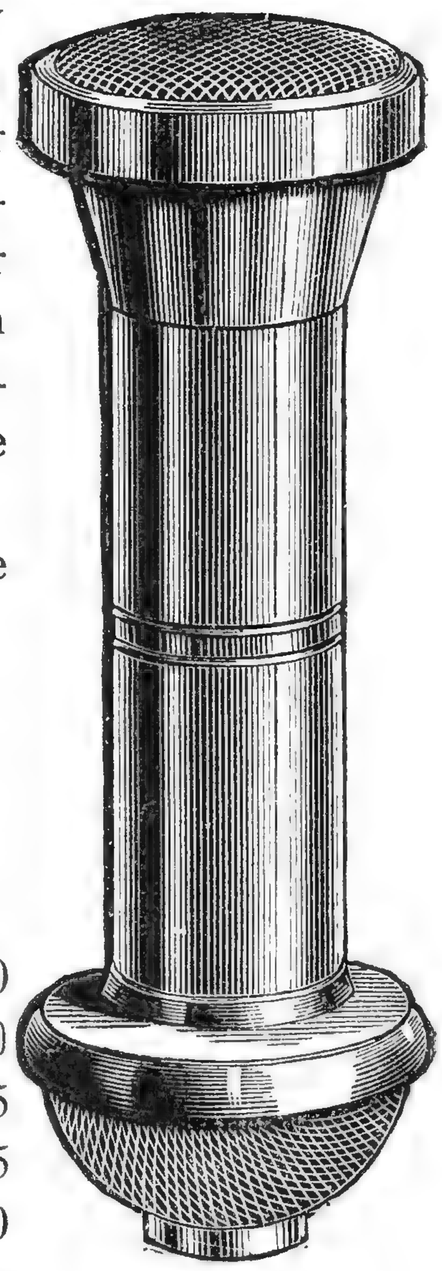
Brass stands are supplied when desired.

For illuminating or natural gas.

PRICES:

		Diam. across top of gauze.	Height.	Price.
No. 5 SB.	Without stand, ...	7/8 in.	3¾ in.	$1.50
No. 10 SB.	Without stand, ...	1¼ in.	4¾ in.	1.80
No. 14 SB.	Without stand, ...	1½ in.	6 in.	2.25
No. 5 SBM.	On brass stand, ...	7/8 in.	4¾ in.	2.15
No. 10 SBM.	On brass stand, ...	1¼ in.	5¾ in.	2.60
No. 14 SBM.	On brass stand, ...	1½ in.	7 in.	3.10

With female fitting, 15c additional.



No. 5 SB.

FLETCHER'S BUNSEN. These are the ordinary brass tube bunsen, with Fletcher's quieting jet. They are correctly proportioned in every detail, and of the full theoretical power, working up to their maximum calculated duty. All are threaded the same as ⅛ iron pipe. The number gives the maximum gas consumption in cubic feet per hour at $\frac{10}{10}$ pressure.

All have air slides; these enable the smaller sizes to be used with a blowpipe, without the necessity of a loose internal tube.

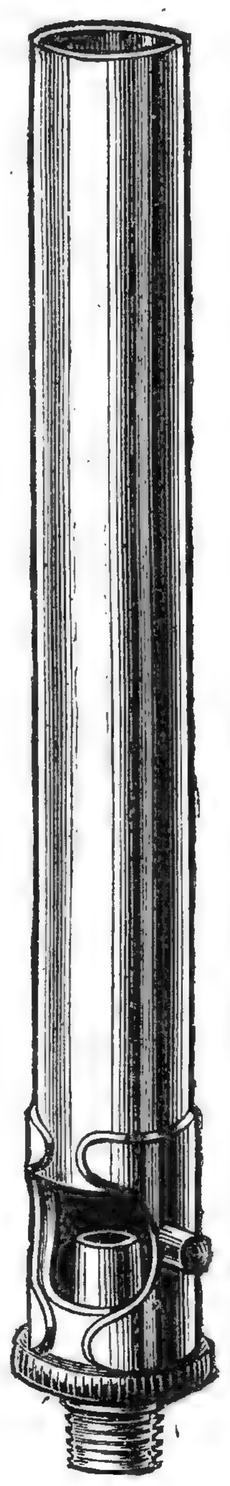
Brass stands only are supplied. The objectionable nature of iron stands on laboratory tables is too well known to need any remark.

For illuminating gas only.

PRICES:

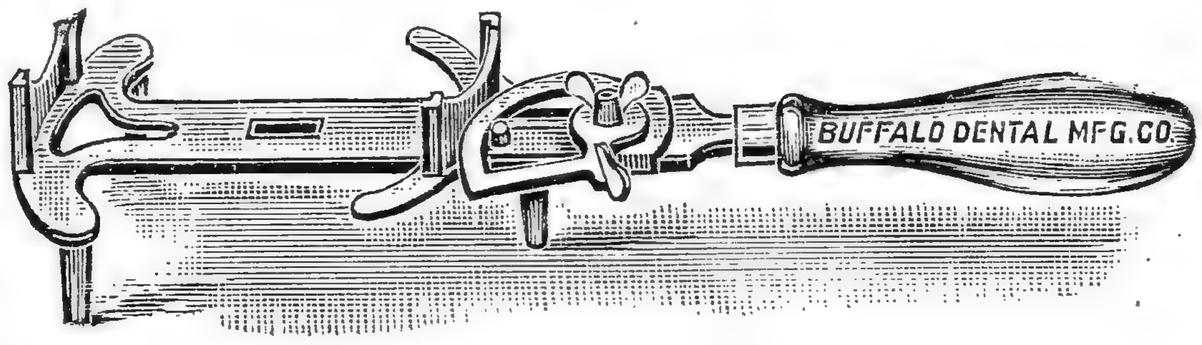
		Size of tube outside.	Height.	Prices.
No. 3FB.	Fletcher's Bunsen, without stand,	⅜ in.	3½ in.	$0.40
No. 5FB.	Fletcher's Bunsen, without stand,	7/16 in.	4¼ in.	.50
No. 6FB.	Fletcher's Bunsen, without stand,	½ in.	5 in.	.60
No. 8FB.	Fletcher's Bunsen, without stand,	⅝ in.	6 in.	.70
No. 12FB.	Fletcher's Bunsen, without stand,	¾ in.	7 in.	1.00
No. 3FBM.	Fletcher's Bunsen, on brass stand,	⅜ in.	4½ in.	.95
No. 5FBM.	Fletcher's Bunsen, on brass stand,	7/16 in.	5¼ in.	1.15
No. 6FBM.	Fletcher's Bunsen, on brass stand,	½ in.	6 in.	1.25
No. 8FBM.	Fletcher's Bunsen, on brass stand,	⅝ in.	7 in.	1.40
No. 12FBM.	Fletcher's Bunsen, on brass stand,	¾ in.	8 in.	1.65

With female fitting, 15c additional.



No. 6 FB.

No. 122B. ADJUSTABLE SOLDERING BLOCK HOLDER. This device will hold any soldering block of carbon or asbestos firmly and without danger of displacement. Soldering Blocks varying in diameter from 3 to 4 inches can be used.

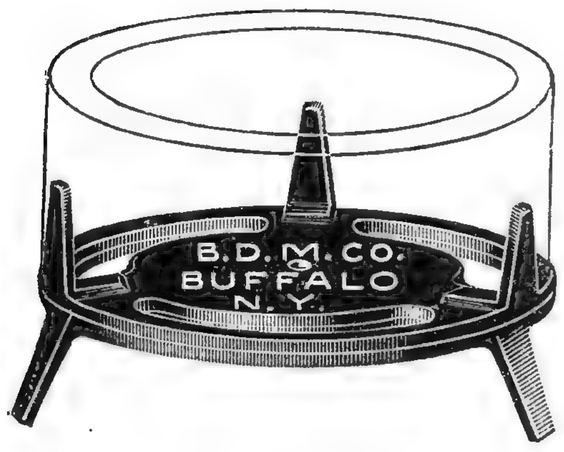


No. 122B. Patented July 22, 1913.

Place the holder in the left hand, the thumb being on the projection of the cam, insert the block between the jaws, force the sliding jaw home by means of the cam and secure by the thumb nut. Square or oblong soldering blocks can be used. The holder is of nickel dipped iron with wooden handle.

PRICE:

No. 122B. Adjustable Soldering Block Holder $0.50



No. 122D.

No. 122D. REVOLVING SOLDERING BLOCK STAND. This stand consists of two sections. The upper section holding the carbon or asbestos block, revolves on the lower, thereby bringing the blowpipe flame to the desired point. Both stationary base and revolving section are substantial iron castings nickel dipped. In the illustration a soldering block is shown in outline.

PRICES:

No. 122D. Revolving Soldering Block Stand, alone, ... 35 cents
No- 122D. Stand, with No. 122 Asbestos Soldering Block . . . 95 cents
No. 122D. Stand, with No. 120 Carbon Soldering Block, . . . 60 cents

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No. 122E. REVOLVING-TILTING SOLDERING BLOCK STAND.

Like the No. 122D, the upper section revolves on the lower, but the entire holder tilts to any angle required. The tilting movement is controlled by a spring clamp, the thumb screw producing just the right tension to maintain the holder in any position. A touch with the blowpipe or finger changes the adjustment to any point within the radius indicated by the angle shown in illustration. The base is heavy, to prevent dragging off the work bench, and is neatly japanned. Diameter of Holder, 4½ inches.



No. 122E.

PRICES:

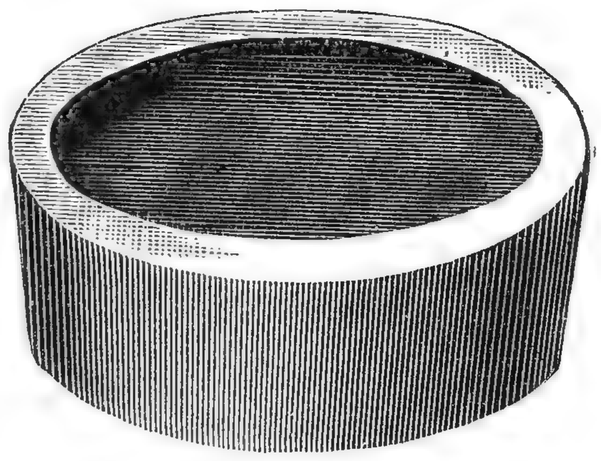
No. 122E. Revolving-tilting Soldering Block Stand, only, ... $1.25
No. 122E. Revolving-tilting Soldering Block Stand, with Asbestos Soldering Block, ... 1.85
No. 122E. Revolving-tilting Soldering Block Stand, with Carbon Soldering Block, ... 1.50

SOLDERING BLOCKS.

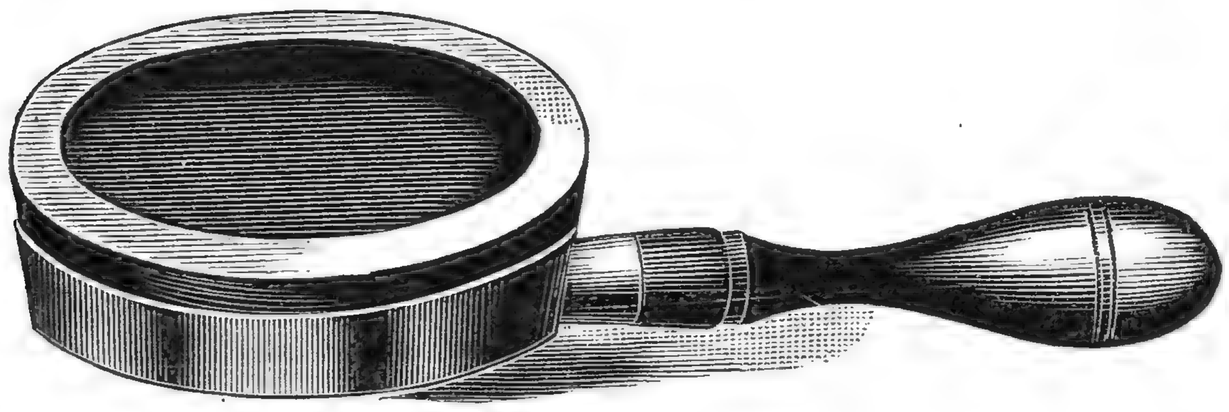
No. 120. CARBON SOLDERING BLOCK. For supporting work under the Blowpipe. Cleanly and perfect non-conductors. They are circular, depressed on each face, and four inches diameter.

PRICE:

No. 120. Carbon Soldering Block, ... 25c



No. 120.



No. 120B.

No. 120A. CARBON BLOCK HOLDER. A very convenient device for holding Carbon Soldering Blocks.

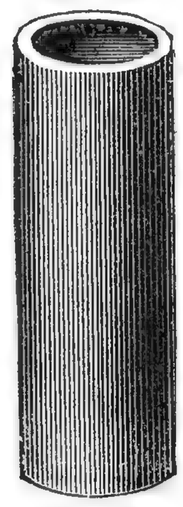
PRICES:

No. 120A. Carbon Block Holder, ... 25 cents
No. 120B. Carbon Block and Holder, ... 50 cents

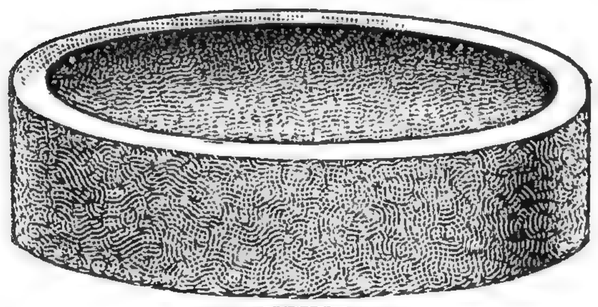
No. 121. CARBON CYLINDER. Made of the same composition as the Carbon Block. More cleanly than charcoal; the cupped ends being admirably adapted for soldering small articles, or for blowpipe assays. Size, 1⅛ x 3 inches.

PRICE:

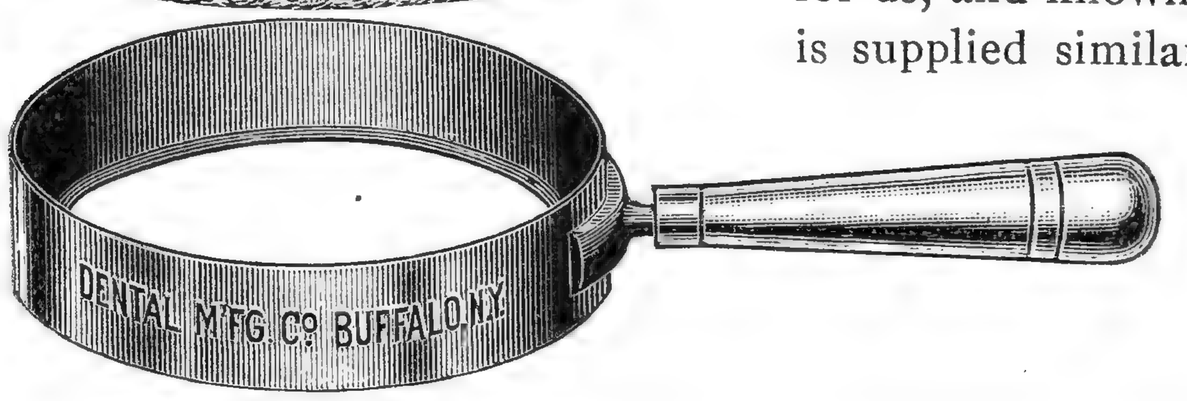
No. 121. Carbon Cylinder, ... 15 cents



No. 121.



No. 122.



No. 122A.

No. 122 & 122A. ASBESTOS SOLDERING BLOCK. These blocks have found favor with many in preference to Carbon Blocks for soldering purposes. They are made especially for us, and known to be of first quality. A holder is supplied similar to the one used for holding Carbon blocks, with a flange to prevent block from falling through.

PRICES:

No. 122. Asbestos Block 60c.
No. 122A. Asbestos Block Holder, ... 25c.

No. 122C. ASBESTOS SOLDERING BLOCK, Small Size. Like the well known No. 122, Asbestos Block in every respect, except smaller, being only 3½ inches in diameter.



No. 122C.

PRICE:

No. 122C. Asbestos Soldering Block, small size, each, ... 45 cents



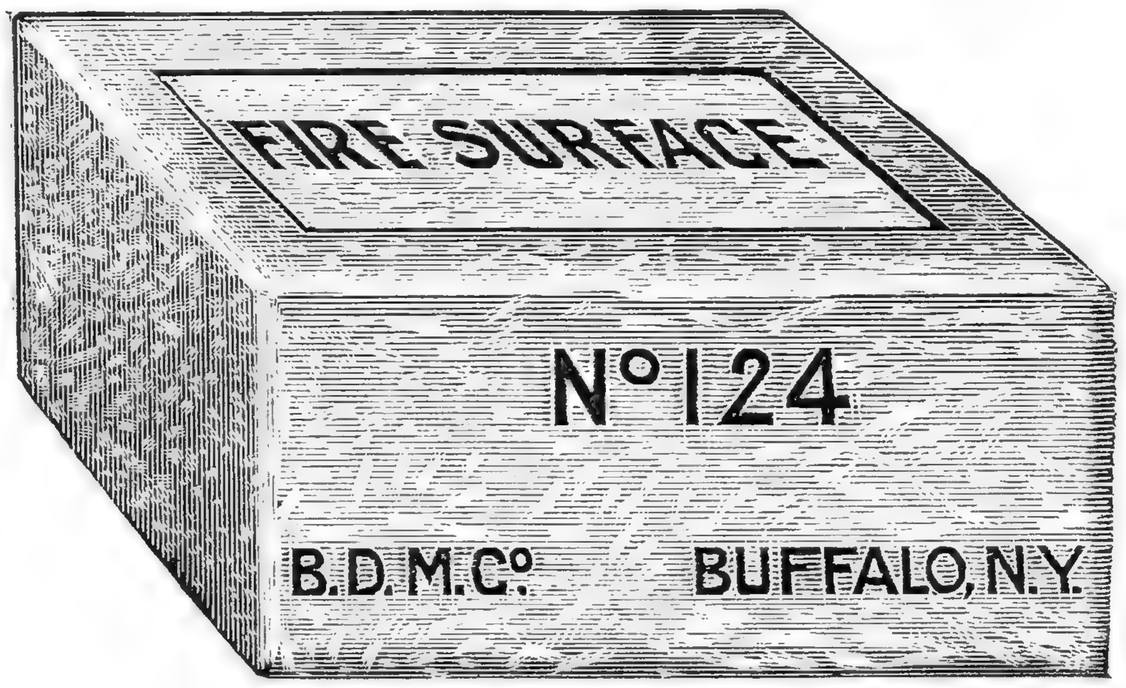
No. 123

No. 123. ASBESTOS SOLDERING CONE. The No. 123, Asbestos Soldering cone has cupped ends and is useful for making blowpipe assays, or for soldering small articles of jewelry, etc. Size 1⅝ inches by 2 inches.

PRICE:

No. 123. Asbestos Soldering Cone, . . 20 cents

No. 124. PREPARED MAGNESIUM SOLDERING BLOCK. Suggested by Dr. H. L. Belcher. Prepared Magnesium Soldering Blocks are composed of carbonate of magnesium with asbestos fibre. Especially advantageous for delicate soldering, as the composition reflects heat better than the ordinary Asbestos Soldering Block, and is loose enough to admit of work being pinned to it. No. 124 Soldering Blocks are properly coated on all sides but the fire surface to prevent flaking, and to make them cleanly to handle.



Size 3 x 3½ x 1 inch thick.

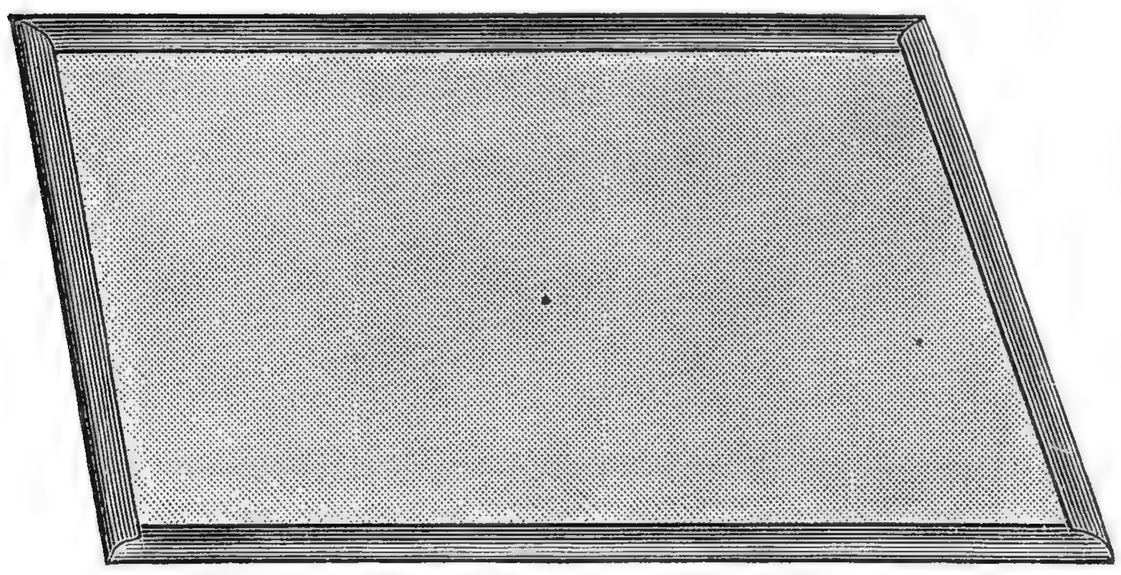
PRICE:

No. 124. Prepared Magnesium Soldering Blocks, each, . . . 15 cents.

CHARCOAL SOLDERING BLOCKS. Chemically prepared. Two sizes: No. 1, 2¼ inches by 3¼ inches. No. 2, 3 inches by 4¾ inches.

PRICES:

No. 1. Charcoal Soldering Blocks, each, ... $0.18
No. 2. Charcoal Soldering Blocks, each, ...30



SQUARE ASBESTOS PADS. For protecting the table during blowpipe operations. They are made from Asbestos board about one-fourth of an inch thick, and edged with iron. They are incombustible, and excellent non-conductors of heat. The advantages to be derived by their use during blowpipe work are too obvious to need further explanation. The two smaller sizes, Nos. 00 and 0, are especially designed for supporting small articles while soldering.

PRICES:

No. 00 AP.	4 in. x 4 in. x ¼ in.,	$0.15
No. 0 AP.	8 in. x 8 in. x ¼ in.,	.40
No. 1 AP.	6½ in. x 10 in. x ¼ in.,	.50
No. 2 AP.	10 in. x 13 in. x ¼ in.,	.85
No. 3 AP.	13 in. x 20 in. x ¼ in.,	1.50

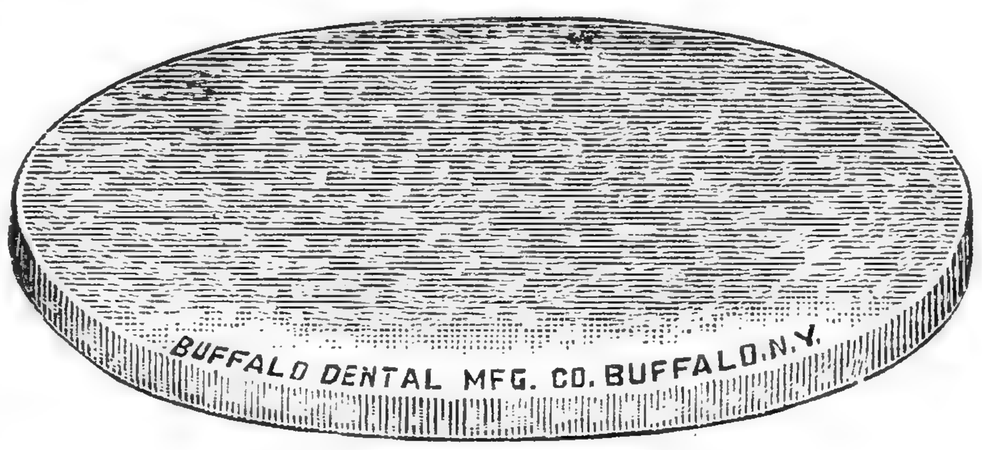
CIRCULAR ASBESTOS PADS

For protecting the work bench during soldering and heating operations.

Can also be used for pinning small jewelry down while soldering.

PRICES:

No. 4½. Circular Asbestos Pad, 4½-in. diam., each, ... $0.08
No. 9. Circular Asbestos Pad, 9-in. diam., each, ...15



FLETCHER'S SOLID FLAME BURNERS. Mr. Fletcher's experiments in the construction of Gas Heating Apparatus led him to the discovery of the correct rule for proportioning burners, and he has produced in his Solid Flame Burner a utensil which, for its power and economy in the use of gas, cannot be surpassed. A mixture of air and gas is produced in which they are combined in proper proportion for complete combustion, the effect being to produce a solid flame; the gas and oxygen of the air combining through its entire volume, instead of at the surface only, as in ordinary flames.

The combustion is therefore rendered more rapid, the flame is lessened in its dimensions, and the heat rendered more intense, and a remarkable economy in the use of gas, is effected. The combustion being perfect, the disagreeable smell of acetylene, the result of bringing cold surfaces in contact with ordinary gas flame, as in heating water, does not appear, as in the case when imperfectly constructed or badly proportioned burners are used.

ADAPTING BURNERS FOR GASOLINE GAS. The constantly varying quality of gasoline gas requires the use of a device by which the size of the gas jet can be varied as it escapes into the "mixing tube," where it is mixed with a certain quantity of air before it is burned. For this purpose either of two devices may be used. The "wheel valve," illustrated in Fig. 1, or the cap-nut regulator, Fig. 2. By referring to Fig. 1, in which the wheel valve is shown screwed into the end of the "mixing tube"

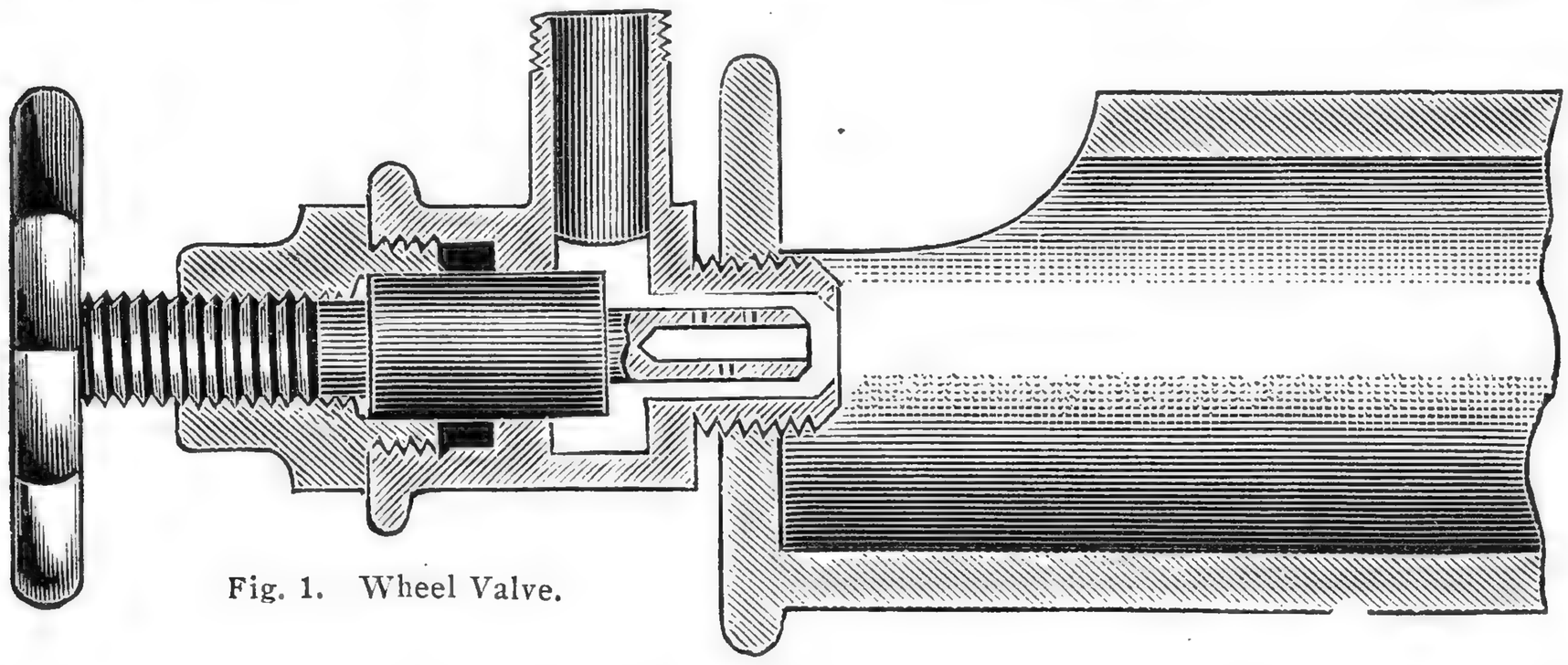


Fig. 1. Wheel Valve.

of a burner, it will be seen that by turning the handle, the shoulder on the valve will be brought to its seat, shutting off the gas in the same manner as would a "globe valve," such as steam fitters use. But before the valve is closed, the hollow stem will pass into and fill the outlet, so that the escaping gas will pass through the hollow stem. The small gas jet thus formed will carry with it an increased proportion of air, and by making the opening in the stem and the large outlet of proper sizes, it is possible to burn, without smoke, either the "richest" or "poorest" gases. Intermediate grades can be provided for by the adjustment of the valve.

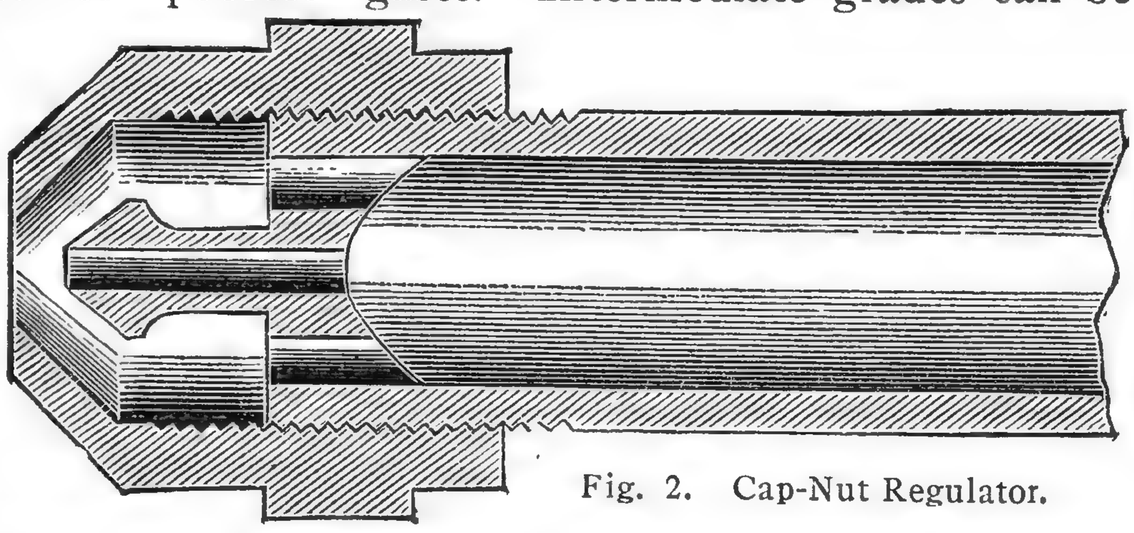


Fig. 2. Cap-Nut Regulator.

In the Cap-Nut Regulator—Fig. 2—the same effect is produced by screwing on or off the cap-nut. This device, however, does not shut off the gas, and thus it requires the use of a stop-cock. The cap-nut regulator is used in the burners of all the gas furnaces operating by draft described in this catalog, and is screwed into the end of the "mixing tube" in the same manner as the wheel valve; the cap-nut being situated inside the tube, in the throat or air opening.

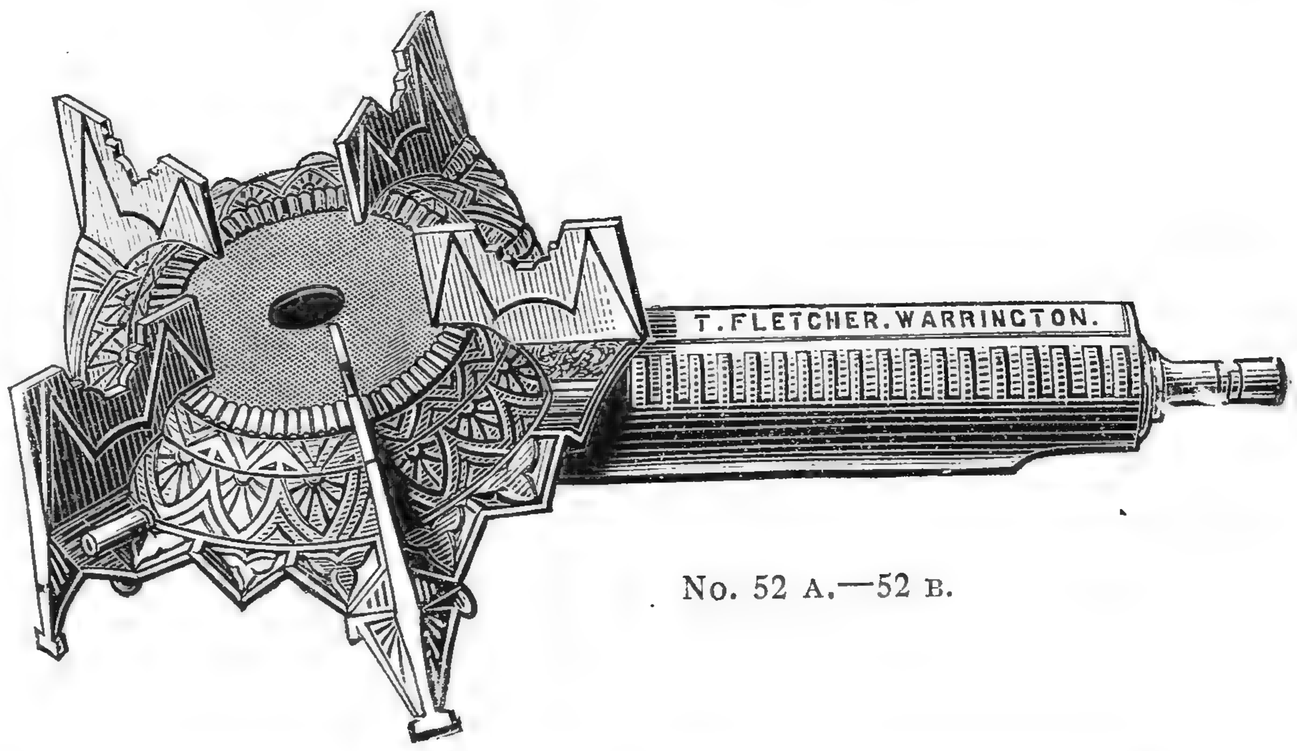
As these devices are often sold separately from the gas burners for which they are designed, prices are quoted below for them. When sold with burners, a deduction is made from these prices equivalent to the value of the ordinary gas jet which they replace.

PRICES:

Diameter of Jet	Diameter of Fit to Burner.	Description.	Used on.	
¼ inch.	½ inch.	Wheel Valve.	Nos. 2R, 47, 46B, ...	$1.15
3/16 inch.	½ inch.	Wheel Valve.	Nos. 1R, 3R, 47A, ...	.95
⅜ inch.	⅞ inch.	Cap-nut.	Nos. 5 and 6 Muffle, . . .	2.00
9/32 inch.	⅝ inch.	Cap-nut.	No. 4 Muffle, 15, 16, . . .	.75
3/16 inch.	⅜ inch.	Cap-nut.	Nos. 2R, 47, 46B, / Nos. 1R, 3R, 47A, ...	.50

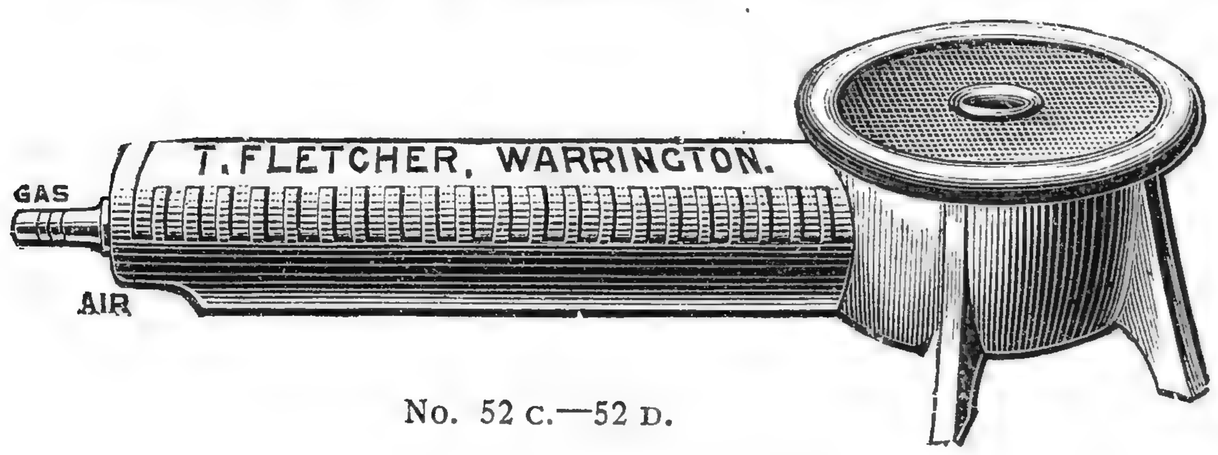
No. 52 FLETCHER'S SPECIAL HIGH-POWER BURNERS. The laws ruling the construction of heating burners, as given in Mr. Fletcher's communication to the Gas Institute and published in the Transactions for 1883, have been strictly adhered to in these burners, which, for their size, are unapproached in power by any burners in existence.

The 6-inch and 8-inch sizes have no tripod or support for vessels. The dimensions of these burners are as follows:



No. 52 A.—52 B.

Size across the Gauze Surface.		Gas Consumption in Cubic Feet.		Gas Pipe Required.
No. 52A.	2¾ in. diameter.	25 ft.	per hour.	⅜ in. clear bore.
No. 52B.	4 in. diameter.	40 ft.	per hour.	½ in. clear bore.
No. 52C.	6 in. diameter.	90 ft. to 100	per hour.	¾ in. clear bore.
No. 52D.	8 in. diameter.	200 ft. to 250	per hour.	1 or 1½ in. clear bore.

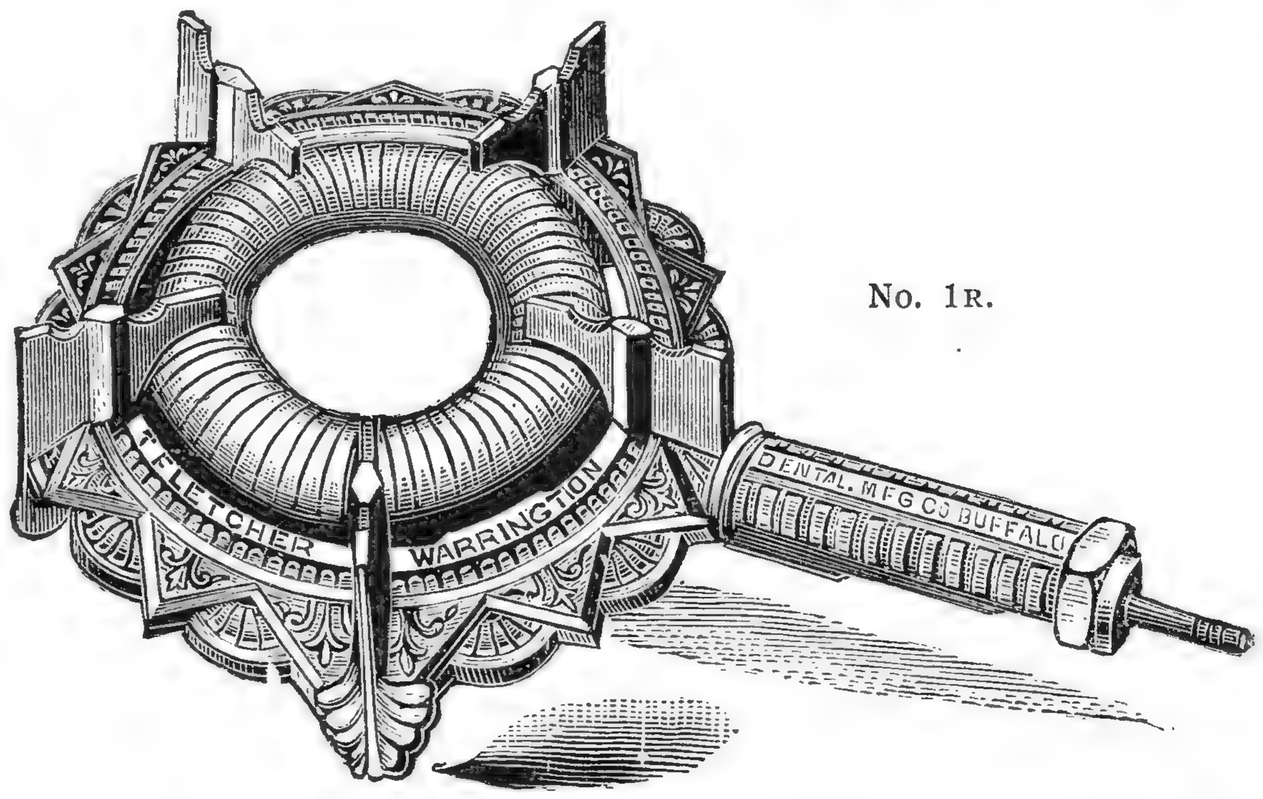


No. 52 C.—52 D.

PRICES:

No. 52A,	$2.50
No. 52B,	3.50
No. 52C,	5.50
No. 52D,	10.00

Nos. 1R & 2R. FLETCHER'S RADIAL BURNERS. This burner, the result of many years' costly experimenting, is an improvement on the well-known FLETCHER'S PATENT SOLID FLAME BURNER, and is acknowledged by experts to be the most perfect burner for daily use ever constructed. The duty obtained is equally as great as with the Solid Flame Burner, with the following advantages: It has no loose parts and is practically undamageable and indestructible with the roughest use. It is made entirely of annealed cast-iron, and works equally well with either coal gas, water gas or air gas. If choked with dirt it can be cleaned in a minute, with a card or a knife.



No. 1R.

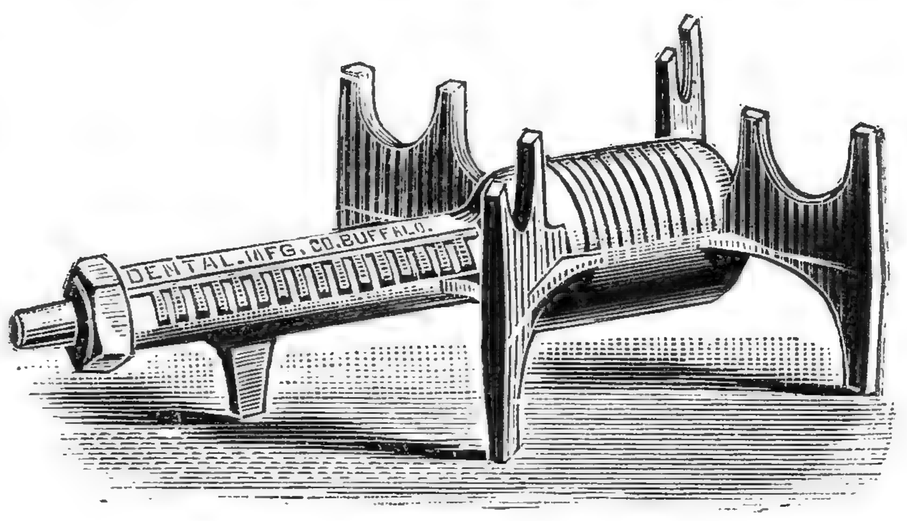
The flames are practically *solid* when in use, and are without any tendency to run to a point in the center; the carbonic oxide flame is unusually short. Maximum gas consumption of No. 1R, 12 feet per hour; No. 2R, 18 feet per hour. The No. 2R is for vessels and pans from 10 to 18 inches in diameter.

PRICES:

No. 1R.	Burner Ring, 3¾ in. diam.; Stand, 6½ in. diam.,		$1.50
No. 2R.	Burner Ring, 5 in. diam.; Stand, 8 in. diam.,		2.00
For Gasoline Gas, with Cap-nut Regulator,	No. 1R, $1.80	No. 2R,	2.30
For Gasoline Gas, with Wheel Valve,	No. 1R, 2.25	No. 2R,	2.95

No. 3R. RADIAL BURNER. This is in one casting, practically indestructible, and will boil water in a light kettle at the rate of two quarts in twelve minutes. Although a very cheap form, it will be found a first-rate burner for general use, and is amply powerful for the ordinary requirements of the laboratory.

Flame surface 1¾ in. diam., 2¼ in. long.

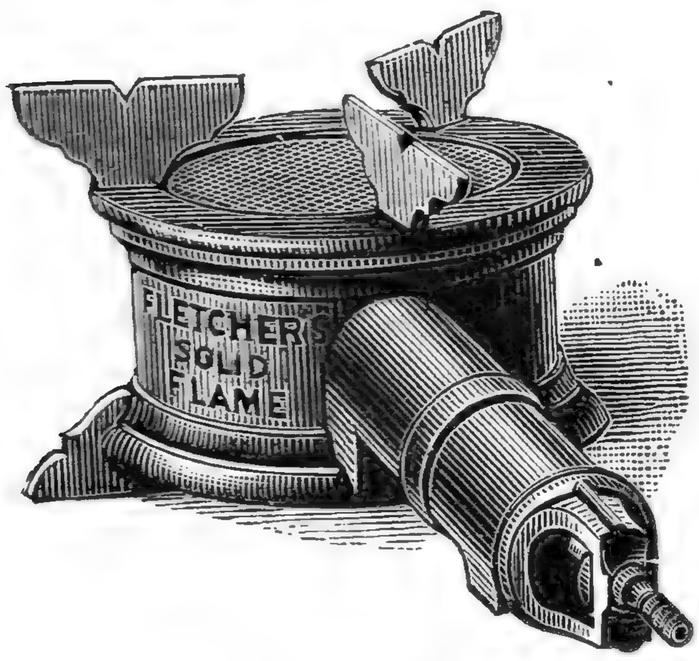


No. 3R.

PRICE:

No. 3R, ... $1.00

No. 46B. FLETCHER'S SOLID FLAME BURNER. The flame is *solid* and the same temperature throughout, the usual heating burners having a flame with a hollow center of unconsumed gas. The burner gives a flame PERFECTLY FREE FROM SMELL. It is simple, strong, cheap and of a power and adaptability unapproached by any known burner.



No. 46B.

This burner will, with equal ease, boil an egg in a small tin sauce pan, or melt half a hundredweight of lead in an iron pot. It will boil half a gallon of water in a flat copper kettle in five minutes, and will melt six pounds of lead or solder in an iron ladle in seven minutes.

NOTE.—Keep the gauze clean, use India rubber tubing, smooth inside, and if a very powerful flame is required, the gas tap must have a large way through. The burner works perfectly with any gas supply, small or large. Diameter of flame surface, 3¾ in.

PRICES:

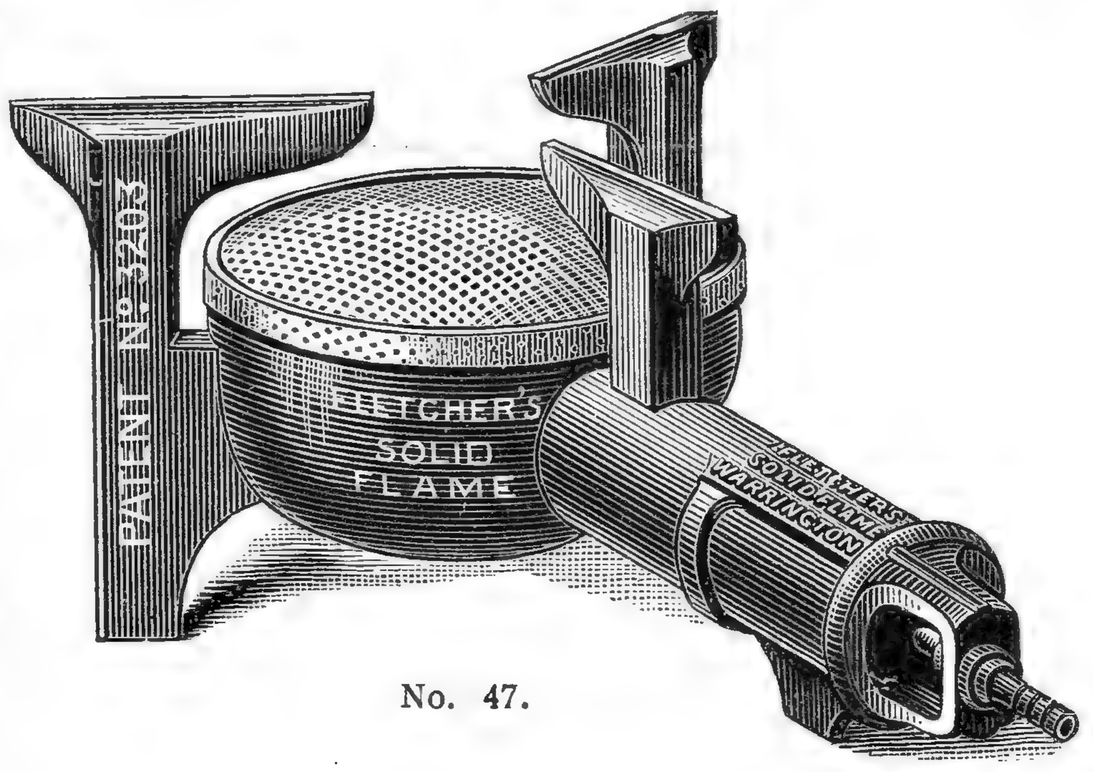
No. 46B. Solid Flame Burner, gas consumption, 35 feet per hour, . .	$2.00
For Gasoline Gas, with Wheel Valve, ...	2.95
For Gasoline Gas, with Cap-nut Regulator, ...	2.30
Extra Gauze Tops, each, ...	.25

No. 47. FLETCHER'S SOLID FLAME BOILING BURNER. FOR LARGE PANS AND QUICK HEATING.—It will boil quickly four or five gallons of water, and will, when required, keep a small pan boiling steadily by simply turning the gas low. Gas consumption, 35 feet per hour.

Diameter of flame surface, 4¼ in.

PRICES:

No. 47. Large size, ...	$2.00
For Gasoline Gas, with Wheel Valve, ...	2.95
For Gasoline Gas, with Cap-nut Regulator, ...	2.30
Extra Perforated Copper Caps,	.35
Extra Iron Bands for Perforated Caps, each, ...	.05



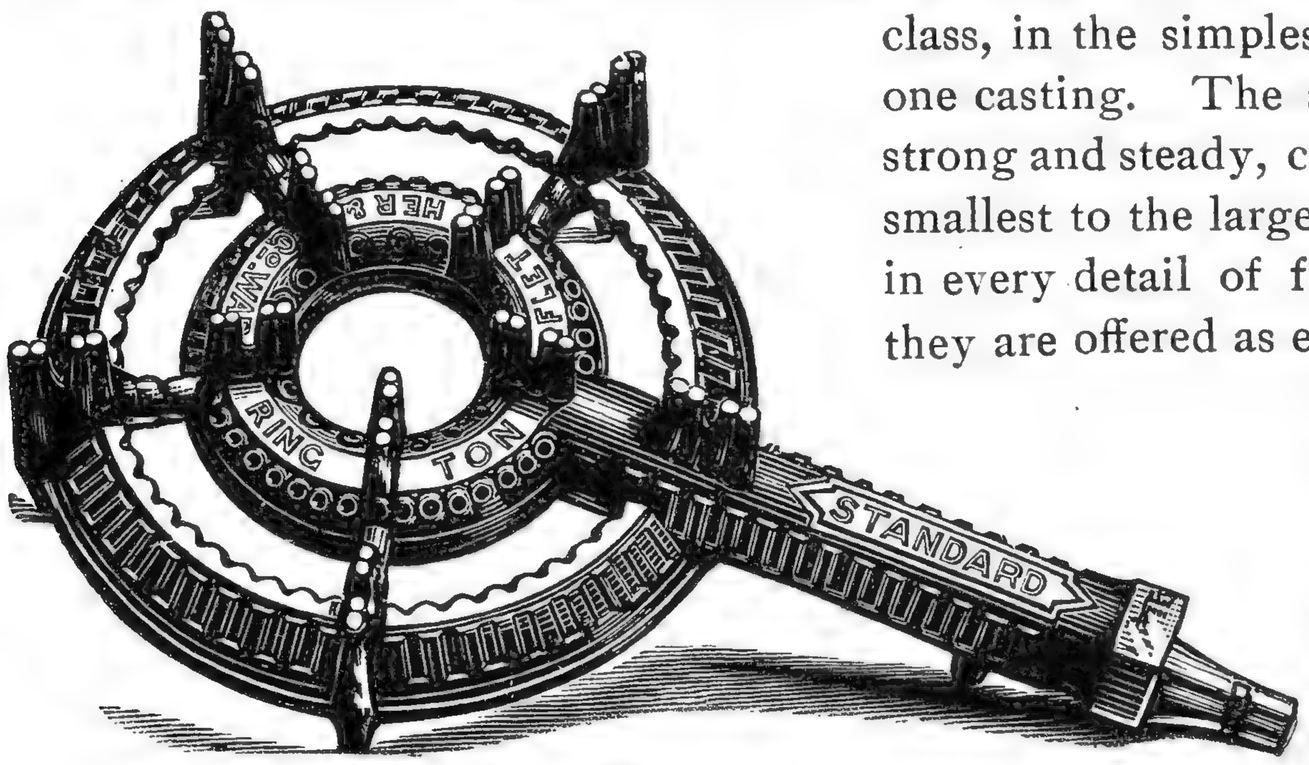
No. 47.

No. 47A. SOLID FLAME BOILING BURNERS. A small size of No. 47, made from improved patterns. These small burners, at their fullest power, burn 12 cubic feet of gas per hour, and are for general work. About two feet of gas per hour will keep a pan boiling. Diameter of flame surface, 3¼ inches.

PRICES:

No. 47A.	Gas Consumption, 12 feet per hour,	$1.00
	For Gasoline Gas, with Wheel Valve,	1.75
	For Gasoline Gas, with Cap-nut Regulator,	1.30
	Extra Perforated Copper Caps,	.30
	Extra Iron Bands for Perforated Caps, each,	.05

Nos. 310-330. FLETCHER'S STANDARD BOILING BURNERS. These burners are designed as a complete series of the highest and most perfect class, in the simplest possible form, and are of one casting. The support for vessels is broad, strong and steady, carrying all vessels, from the smallest to the largest. The burners are perfect in every detail of form and construction, and they are offered as examples of the best burners which it is possible to construct for ordinary uses.



No. 310.

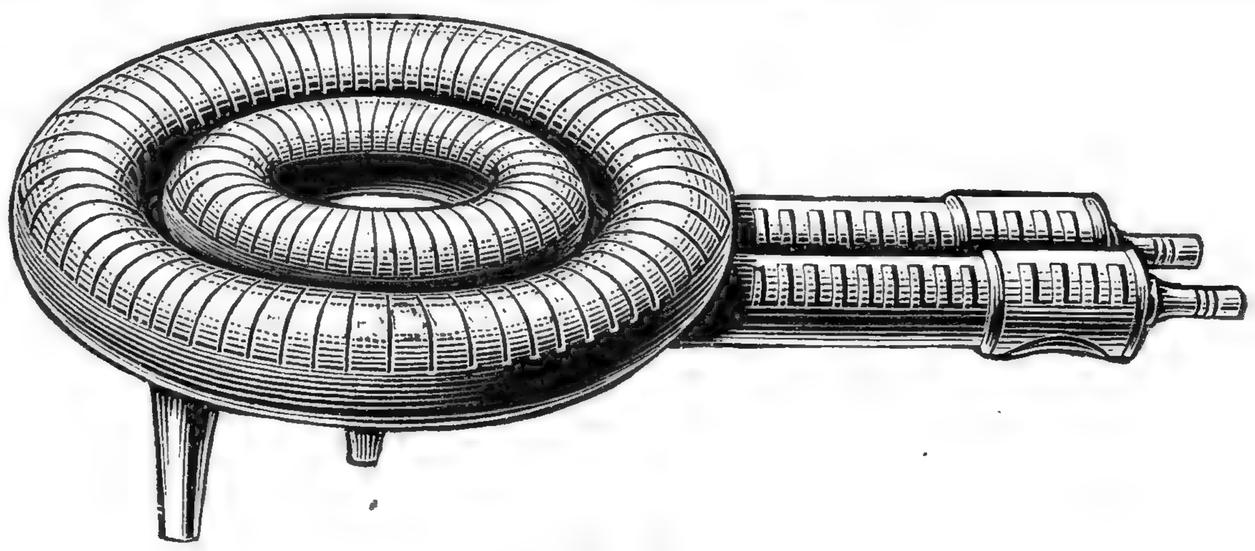
The maximum gas consumption at day pressure of gas (one inch) is given in the price list and the same figures indicate the number of quarts of water boiled in one hour in a light broad-bottomed copper vessel.

No. 330 has two concentric burners with two separate taps. The price includes taps, complete for this size.

PRICES:

		Diam. across support for vessels	
No. 310.	Standard Boiling Burner, 10 feet per hour,	5½ in.	$1.50
No. 315.	Standard Boiling Burner, 15 feet per hour,	7 in.	2.00
No. 320.	Standard Boiling Burner, 20 feet per hour,	8 in.	2.50
No. 330.	Standard Boiling Burner, 30 feet per hour,	10 in.	5.00

No. 4R. DOUBLE CONCENTRIC RADIAL BURNER. WITHOUT STAND.—This burner is made up of two rings separate from each other, and each requiring its own connection to the main. The outer ring is 9 inches in diameter and will burn 30 feet of gas per hour. The inner ring will burn 10 feet per hour. No taps are furnished with the burner. It is designed for use under vessels which have their own support.

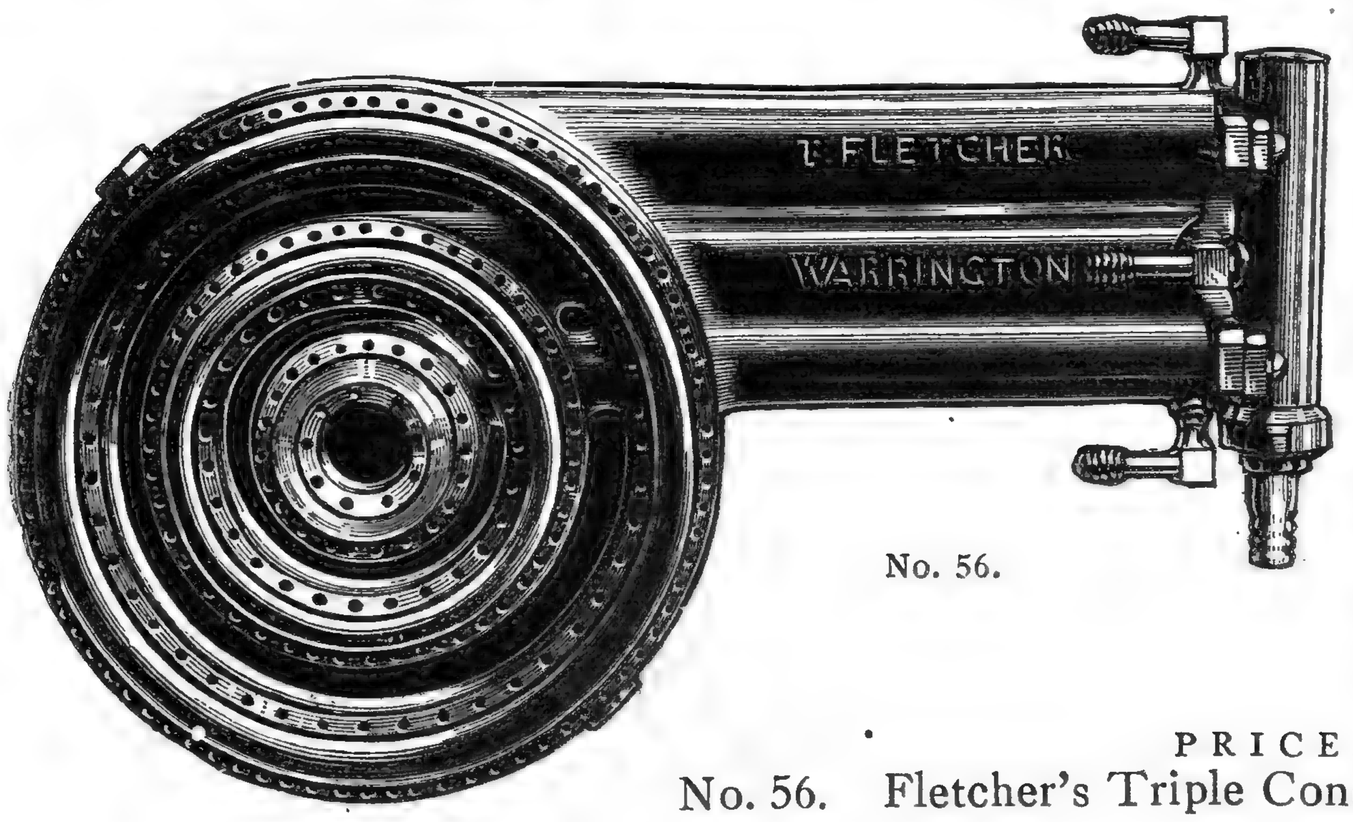


No. 4R.

PRICES:

No. 4R.	Fletcher's Double Concentric Radial Burner,	$5.00
No. 5R.	Small Ring, separately,	2.00
No. 6R.	Large Ring, separately,	3.00
No. 5R.	For Gasoline Gas, with Cap-nut Regulator,	2.30
No. 6R.	For Gasoline Gas, with Cap-nut Regulator,	3.30
No. 5R.	For Gasoline Gas, with Wheel Valve,	2.75
No. 6R.	For Gasoline Gas, with Wheel Valve,	3.95

No. 56. FLETCHER'S TRIPLE CONCENTRIC BURNER. This is 8½ inches outside diameter, the three burners being in one substantial casting. It has been designed, without consideration of cost, as the most powerful concentric ring burner it is possible to produce, giving at command exact powers and exact sizes of flames. Each ring will bear turning down to a double circle of minute points of flame, which will burn equally and steadily all around. Gas consumption of inner ring, 9 feet per hour; middle ring, 20 feet; outer ring, 24 feet. The three combined, 53 feet per hour.



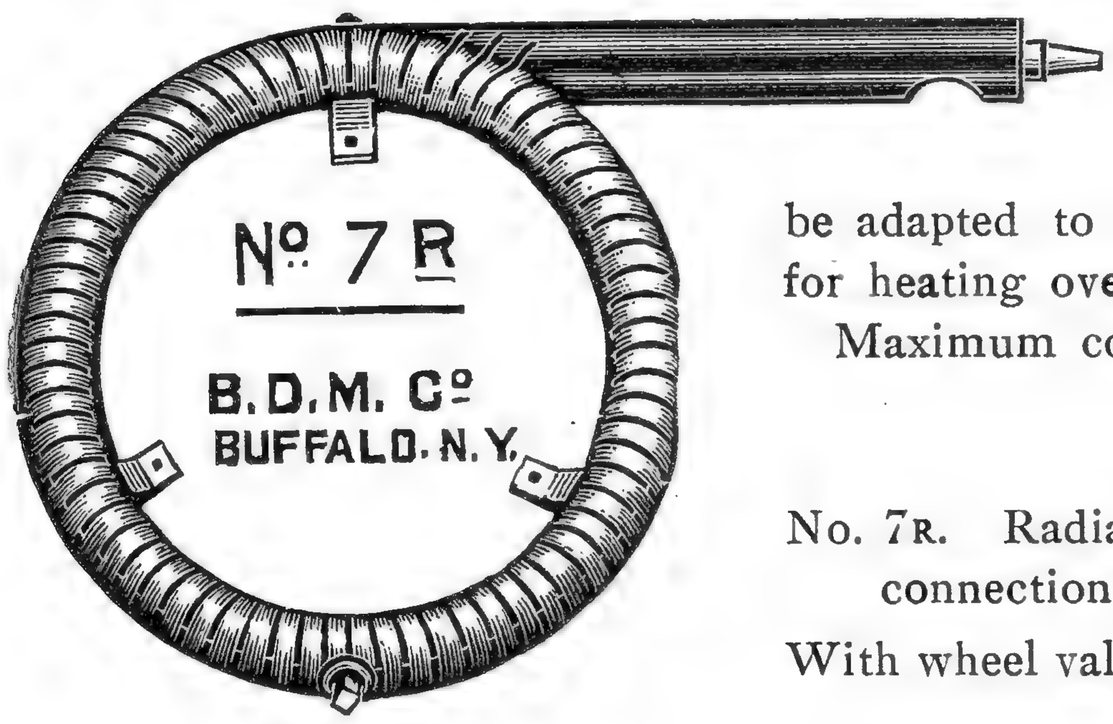
No. 56.

PRICE:

No. 56. Fletcher's Triple Concentric Burner, . $13.50

No. 7R. RADIAL BURNER. Diameter of ring, 9⅝ inches. Length, exclusive of jet, 14½ inches; with lugs for securing to sheet iron, or to take iron supports. May be adapted to special uses in certain locations for heating ovens, large vessels, etc.

Maximum consumption about 30 feet per hour.

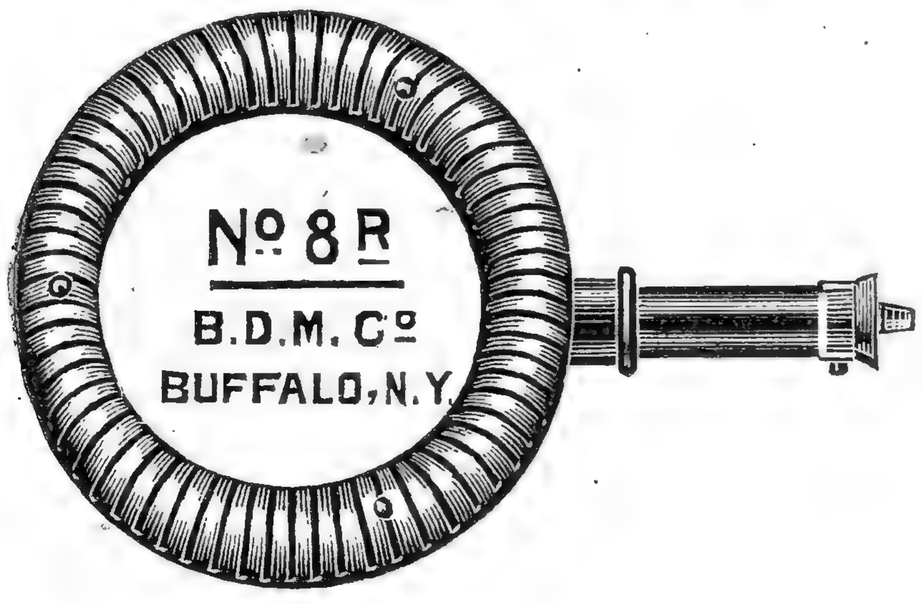


PRICES:

No. 7R. Radial Burner, with jet for hose connection $3.00

With wheel valve for gasoline gas, extra . . 1.00

No. 8R. RADIAL BURNER. An 8-inch burner ring with hub threaded for ¾-inch gas pipe. Stock pattern fitted with 8 inches gas pipe and brass air mixer, as illustrated. Maximum consumption about 25 feet per hour.



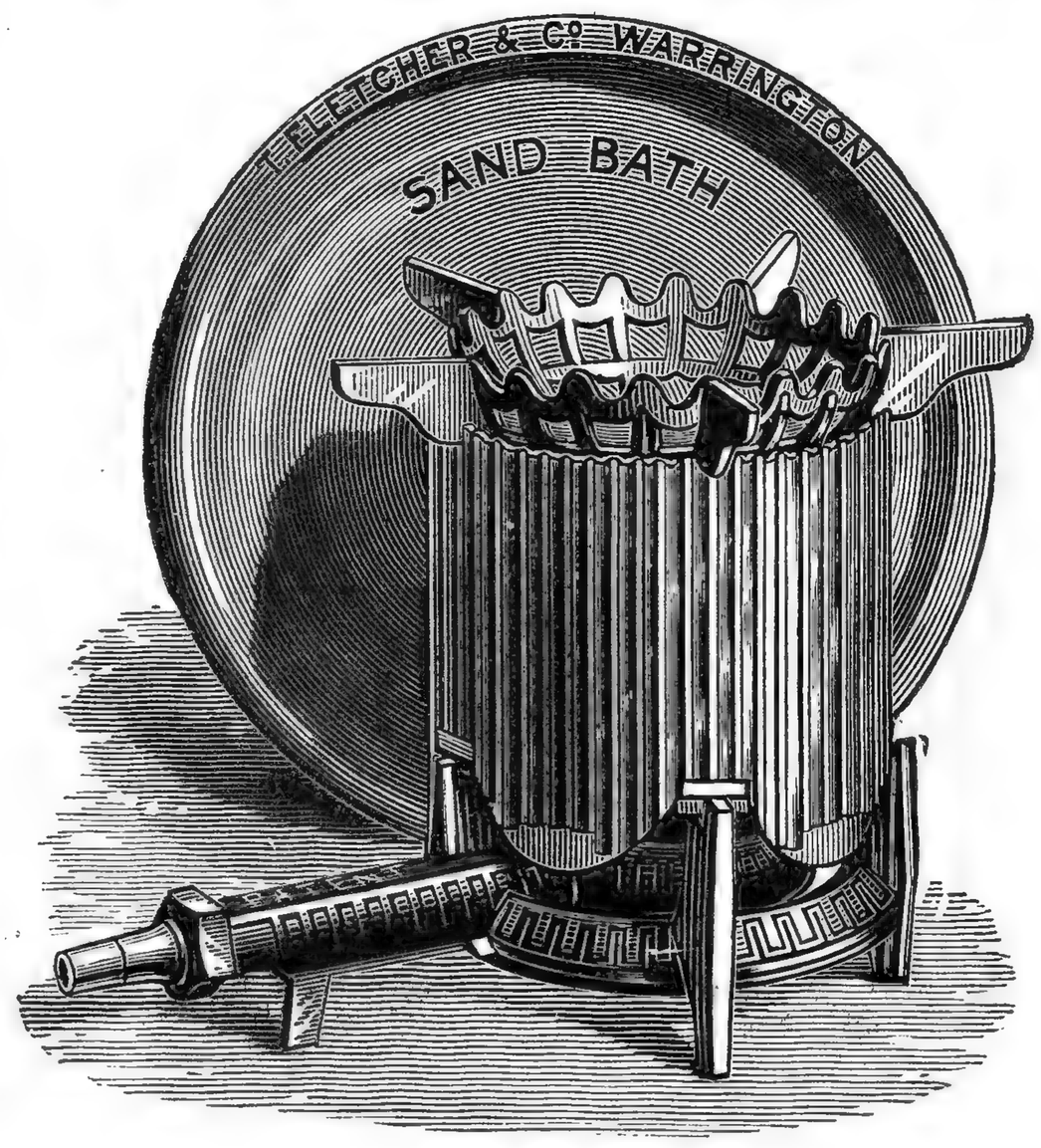
PRICES:

No. 8R. Radial Burner, fitted with gas pipe and mixer, as illustrated $3.00

No. 8R. Radial Burner, without gas pipe and mixer, with hub threaded to take ¾-inch gas pipe, . . 2.50

NOTE.—All heating burners are supplied for illuminating gas unless otherwise specified. No advance in list prices, if ordered for natural gas.

Nos. 210-230. NEW LABORATORY BURNERS. There are probably few chemical or physical laboratories where the well-known low-temperature burners are not known. The New Laboratory Burners serve a similar purpose, but with much wider range, and without any liability to damage with the roughest use. The stand for vessels will carry round glass flasks, porcelain dishes, or flat-bottomed vessels of any size with perfect steadiness. The vessels can, by lifting the cylinder, be placed at different heights above the flame, which will burn steadily when turned down to its lowest point. A SAND BATH can be supplied with each. These burners are made in four sizes.



No. 210. Height, adjustable from 6½ to 7½ in.; support for flask, 4¼ in. diameter, 1¼ in. deep, and for flat vessels, 6½ in. diameter; Sand Bath, 9 in. diameter, 1 in. deep; gas consumption, per hour, maximum 10 feet, minimum 1¼ feet.

No. 215. Height, adjustable from 7 to 8 in.; support for flask, 5¼ in. diameter, 1½ in. deep, and for flat vessels, 7½ in. diameter; Sand Bath, 10 in. diameter, 1 in. deep; gas consumption, per hour, maximum 15 feet, minimum 2 feet.

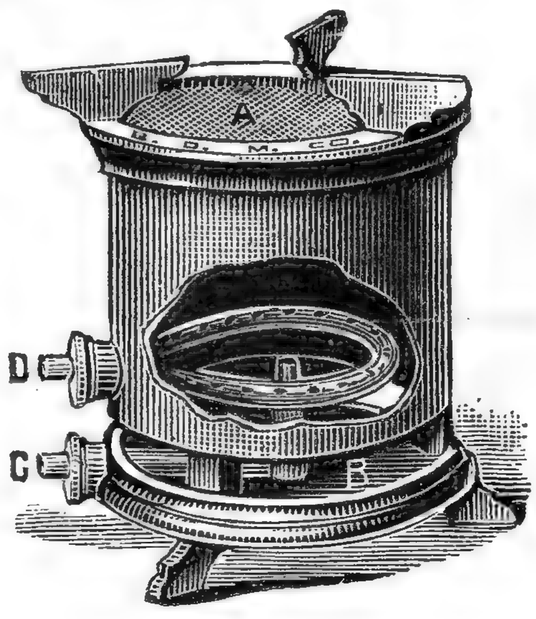
No. 220. Height, adjustable from 8 to 9 in.; support for flasks, 7 in. diameter, 1¾ in. deep, and for flat vessels 9 in. diameter; Sand bath, 13 in. diameter, 1 in. deep; gas consumption, per hour, maximum 20 feet, minimum 3 feet.

No. 230. Height, adjustable from 9¼ to 10¼ in.; support for flasks, 8 in. diameter, 2 in. deep, and for flat vessels, 11 in. diameter; Sand Bath, 15 in. diameter, 1 in. deep; gas consumption, per hour, maximum 30 feet, minimum 1½ feet. This size has two concentric burners with separate taps to each.

PRICES:

			Sand Bath—extra
No. 210.	New Laboratory Burner,	$2.50	$0.60
No. 215.	New Laboratory Burner,	3.00	0.90
No. 220.	New Laboratory Burner,	4.50	1.35
No. 230.	New Laboratory Burner,	7.50	1.75

No. 7 and No. 7A. LOW TEMPERATURE BURNERS. This burner gives a complete range of temperature from a gentle current of warm air to a clear red heat, and is so perfectly under control that a common glass bottle may be placed on the tripod and heated to any required temperature without the slightest risk of fracture. In practice it dispenses with drying closets, sand and water baths, etc., and is equally well adapted for drying, evaporating, boiling and general purposes. For very low temperatures the ring must be lighted through the opening B. This gives a steady current of heated air through the gauze above. For boiling, etc., the light must be applied on the surface of the gauze, thereby providing a large body of blue flame which can be urged by the blast pipe C. This is one of the most generally useful burners, and stands hard, dirty work without injury. The gauze, if choked up with dirt, can be replaced in a few seconds. Gas consumption, 25 feet per hour.

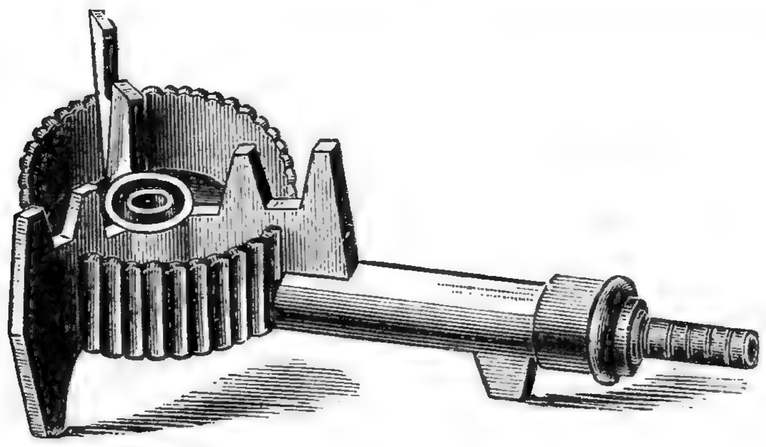


No. 7A

PRICES:

No. 7.	Low Temperature Burner, without Blast Pipe C,	$1.75
No. 7A.	Low Temperature Burner, with Blast Pipe C,	2.00

Nos. 200 and 201. Fletcher's Argand Bunsens. A cheap, simple, indestructible burner for general work. The flame of these burners is shorter, more compact and higher in temperature than that of an ordinary Bunsen, and is also free from odor. The sizes given are the bore of the horizontal tube.



No. 201.



No. 200.

PRICES:

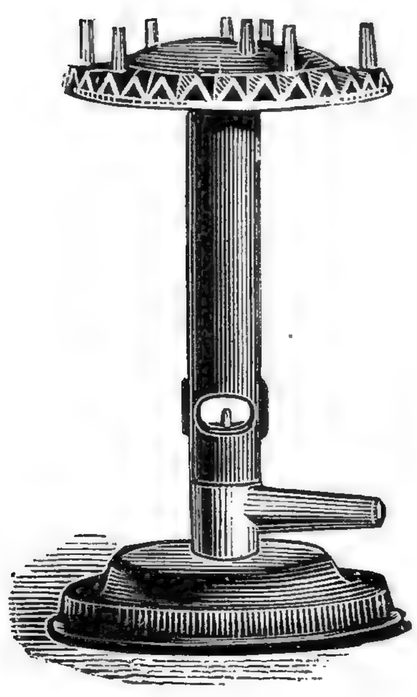
No. 200, ⅜-in. size, gas consumption, 2	feet per hour.	Without Tripod, $0.50
No. 200, ½-in. size, gas consumption, 3½	feet per hour.	Without Tripod, .75
No. 200, ¾-in. size, gas consumption, 7	feet per hour.	Without Tripod, 1.00
No. 201, ⅜-in. size, gas consumption, 2	feet per hour.	With Tripod, . . .65
No. 201, ½-in. size, gas consumption, 3½	feet per hour.	With Tripod, . . .95
No. 201, ¾-in. size, gas consumption, 7	feet per hour.	With Tripod, . . 1.25



No. 53A and B.



No. 53C.



No. 54A and B.

Nos. 53A, B, C and 54A, B, C. STAR BURNERS. The short flames which issue laterally from the holes in the edge of the head of these burners ascend but a short distance, and they are therefore suitable for uses where direct contact of the flame with the object to be heated is not desired. They should be used for heating water, etc., in vessels with concave bottoms or those which present obstructions to the free escape of the products of combustion.

The notched edge of the burner heads shed water without allowing it to extinguish the flame, which is, therefore, not likely to be put out by the boiling over of anything heated upon them.

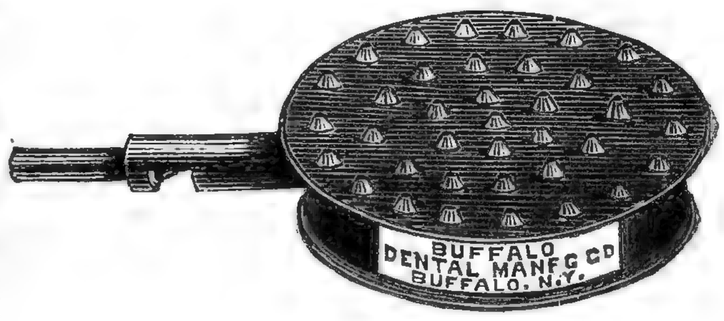
These burners are made in three sizes, A, B and C, 3, 3½ and 1½ inches in diameter, burning 8, 12 and 3 feet of gas respectively. Furnished to be screwed on to a ⅛-inch gas pipe as a permanent fixture (No. 53), or on a stand, for use with rubber tubing connection (No. 54).

PRICES:

No. 53A.	Without Stand, 3-inch size,	. . . . 40 cents.
No. 53B.	Without Stand, 3½-inch size,	. . . 50 cents.
No. 53C.	Without Stand, 1½-inch size,	. . . 30 cents.
No. 54A.	With Stand, 3-inch size,	. . . . . 80 cents.
No. 54B.	With Stand, 3½-inch size,	. . . . 90 cents.
No. 54C.	With Stand, 1½-inch size,	. . . . 70 cents.

NOTE—All heating burners are supplied for illuminating gas unless otherwise specified No advance in list prices if ordered for natural gas.

No. 130. COPPER EVAPORATING BURNER. For Glass and Porcelain Vessels, and General Laboratory Work.—This burner is a great improvement on the ordinary coil burner in use, owing to the fact that currents of cold air, which are so fatal to glass and porcelain dishes, cannot reach the vessel, as is the case with the coil burners. The flames are blue and smokeless, and are not liable to be extinguished by a splash, being raised above the body of the burner. The burner is made in solid copper with lap joints (without solder). The total height of the burner is about 1½ inches, and is nearly the same in all sizes. To get the best results from the burner, it should be kept perfectly clean. This is the safest burner known for heating glass flasks, giving a FLAT flame of any power which cannot touch the flask. The diameter of the burner should be about half that of the flask which it is intended to heat.

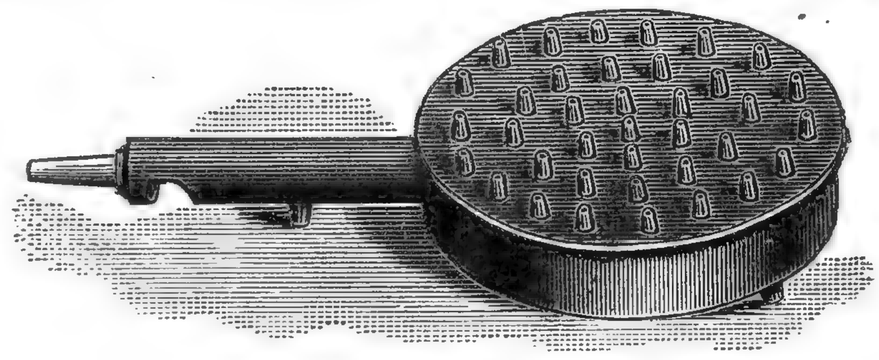


No. 130.

PRICES:

No. 130.	4-inch,	$1.50	9¼-inch,	$3.50
	5-inch,	2.00	10¾-inch,	5.00
	6½-inch,	2.50	12-inch,	7.00
	7¾-inch,	3.00		

No. 131. CAST-IRON EVAPORATING BURNER. For some purposes it is more durable than the copper ones, which it resembles in construction.


No. 131.

PRICES:

No. 131. 4-inch, $1.00 5-inch, $1.25
6½-inch, $2.00

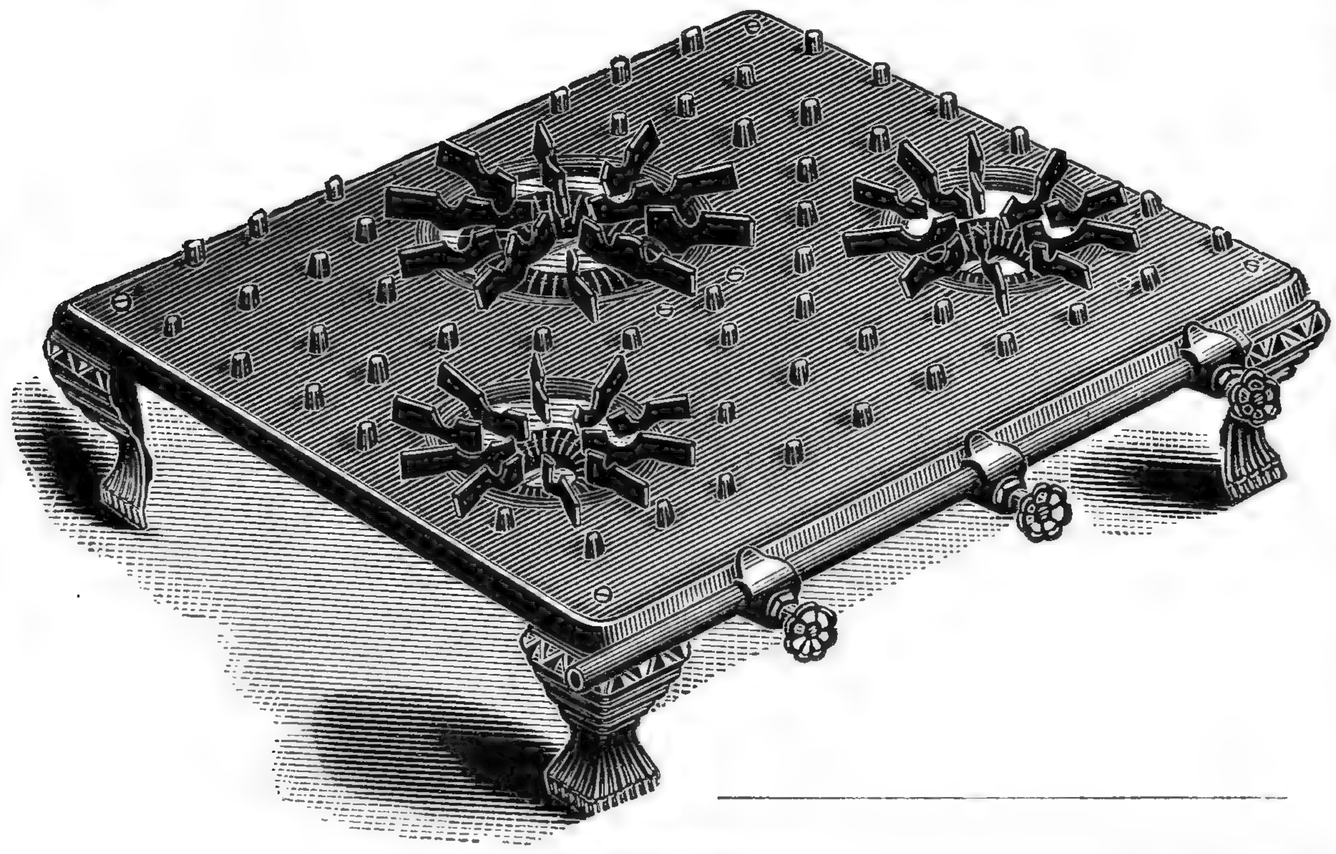
PROPER ADJUSTMENT OF BURNER JETS. Burners With Fixed Jets are properly adjusted before leaving the factory, to secure the best results under ideal conditions. As conditions vary in different localities, it is sometimes found necessary to slightly alter the adjustment.

If the gas jet is too large the proportion of gas to air will be excessive, and the flame will be large, ineffective and sometimes streaked with yellow. In this case the brass jet through which the gas issues should be upset by striking it with a very small hammer so as to diminish the size of the hole from which the gas passes into the mixing chamber.

If the gas jet is too small the flame will be small, and if it burns from a gauze or perforated metal surface, the gauze or perforated metal will become red hot and is likely to burn out quickly. If this is the case, the orifice of the jet tube must be enlarged.

When the gas and air are properly proportioned, the flame will be of medium size, with a greenish film floating in it, close to, but not touching, the burner.

No. 81. HOT PLATE. This has two Radial Burners 3¾ inches diameter, and one 5 inches diameter. Gas consumption, 10 and 15 feet per hour, respectively. This, like the No. 80, presents a level surface upon which the vessel to be heated is sustained.

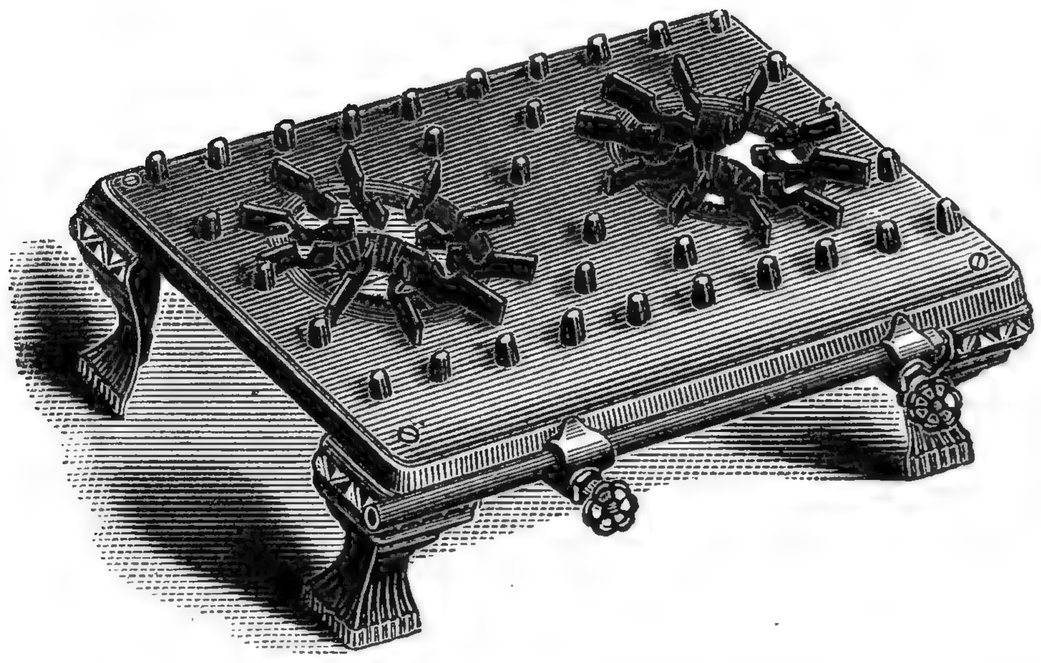


Size of top plate, 19½ x 22½ inches; distance between centers of burners, 10 inches.

PRICES:

No. 81. Hot Plate, $8.50
For Gasoline Gas, 9.25

No. 80. TWO-BURNER HOT PLATE. With two Radial Burners, 3¾ inches diameter. Gas consumption 10 feet per hour each. The pins and spider rings over the burners are the same height, giving a level surface for sustaining the vessel to be heated.

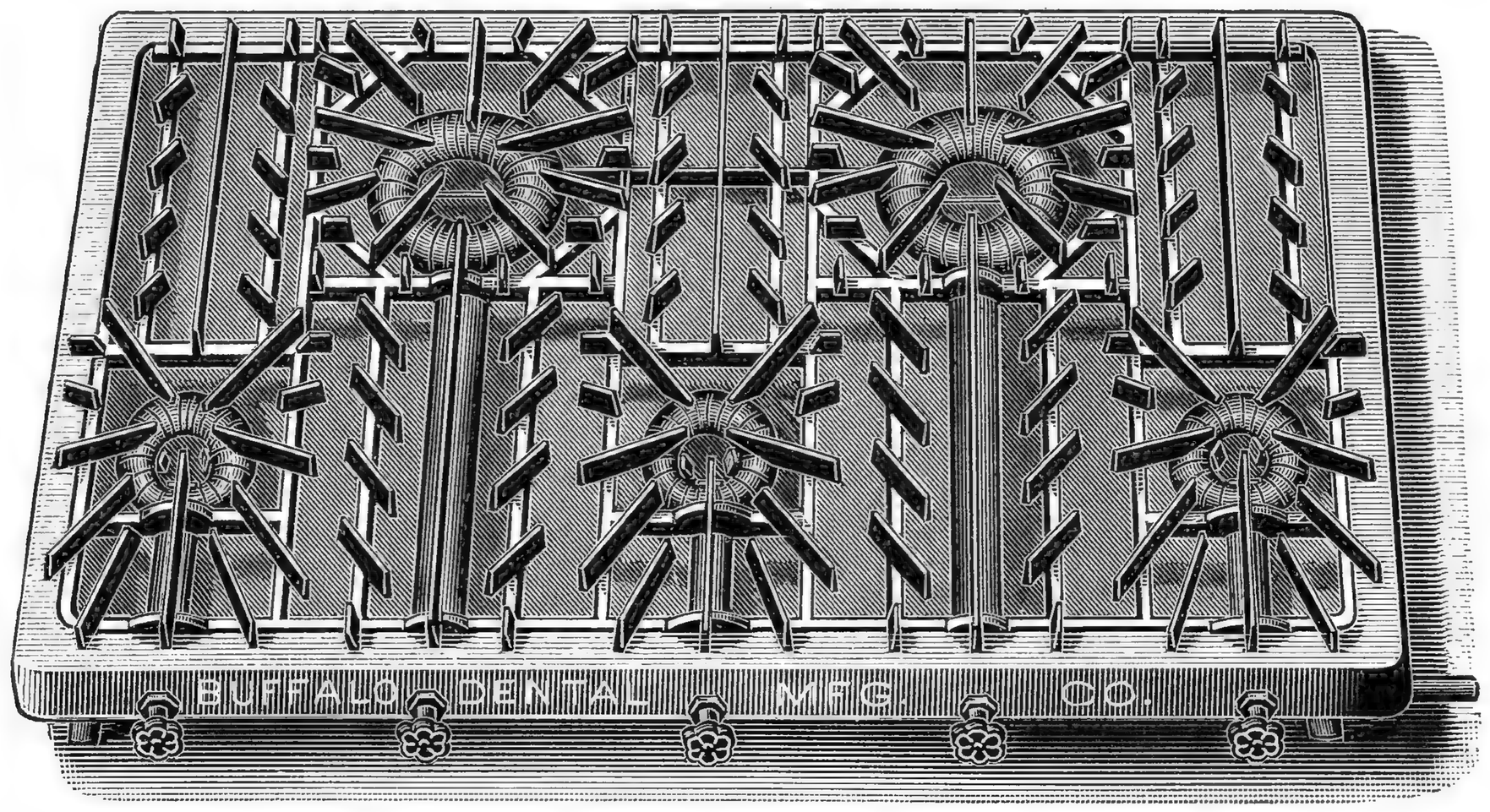


Size of top plate, 11½ x 18¾ inches; distance between centers of burners, 10 inches.

PRICES:

No. 80. Hot Plate, . . $6.00
For Gasoline Gas, . . . 6.50

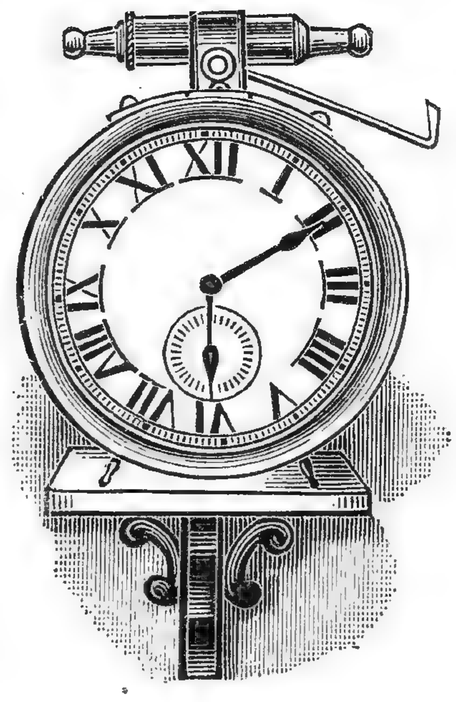
No. 83. FIVE-BURNER HOT PLATE. This has five burners—two large and three small. The supporting ribs upon which the articles to be heated are placed, form a level surface, and their disposition is such as to insure perfect combustion of the gas. They are in sections, which, with the rim upon which they rest, and the burners, are removable at pleasure, affording ready and complete access to the bottom casting, if it should become necessary to clean up any drip or slop. The table is protected from the radiated heat of the burners.



Dimensions: 35 inches wide by 21 inches deep. Burners 11 inches apart between centers.

PRICES:

No. 83. Hot Plate, ... $18.00
For Gasoline Gas, ... 19.25



B. D. M. CO.'S TIME REGULATOR. For shutting off the gas supply at any desired time. The Time Regulator consists of a valve controlled by a lever and mounted on a suitable clock. The valve is operated by engaging the lever with screw on the minute arbor on the back of clock. At the end of the period for which it is set the lever is automatically cast off and the valve closed, thus cutting off the gas supply.

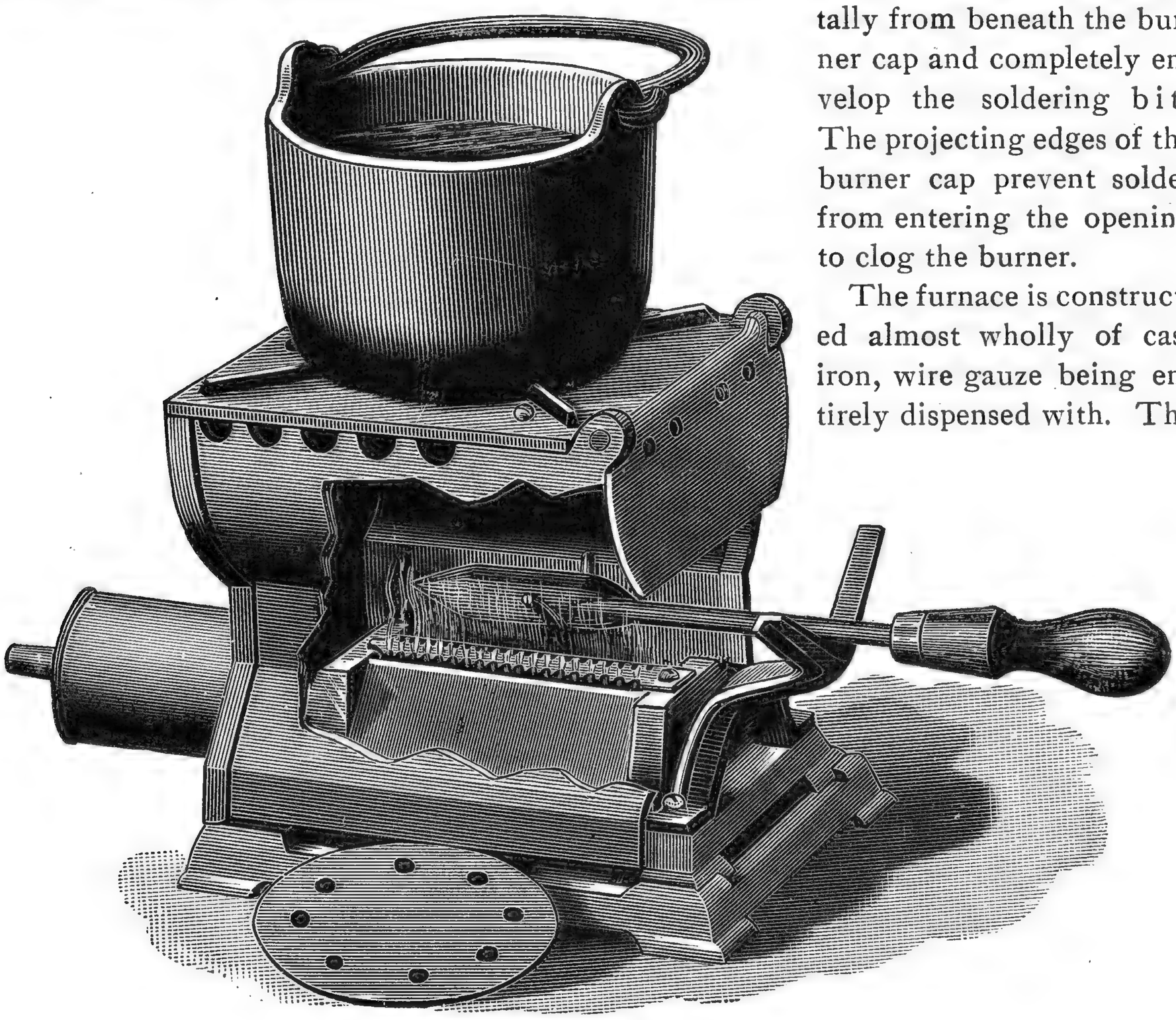
The Time Regulator is "cut in" in the rubber tubing between gas burner and supply tap. Two sizes: No. 1, with ⅛ inch gas passage through valve; No. 2, $\frac{5}{16}$ inch gas passage.

PRICES:

No. 1. B. D. M. Co., Time Regulator, . . . $4.00
No. 2. B. D. M. Co., Time Regulator, . . . 5.50

No. 18A. ACME GAS FURNACE. For heating soldering bits and general use in metal pattern work, electrotyping, etc. This furnace has been improved and is now furnished with an entirely new and powerful burner. Two flames issue horizontally from beneath the burner cap and completely envelop the soldering bit. The projecting edges of the burner cap prevent solder from entering the opening to clog the burner.

The furnace is constructed almost wholly of cast iron, wire gauze being entirely dispensed with. The top of the hood is flat, with a griddle hole, and can be used for melting solder, heating articles to be soldered, etc. This furnace is largely used in Technical Schools, over fifty being used by the Pratt Institute of Technology, Brooklyn, N. Y.



No. 18A. IMPROVED PATTERN.

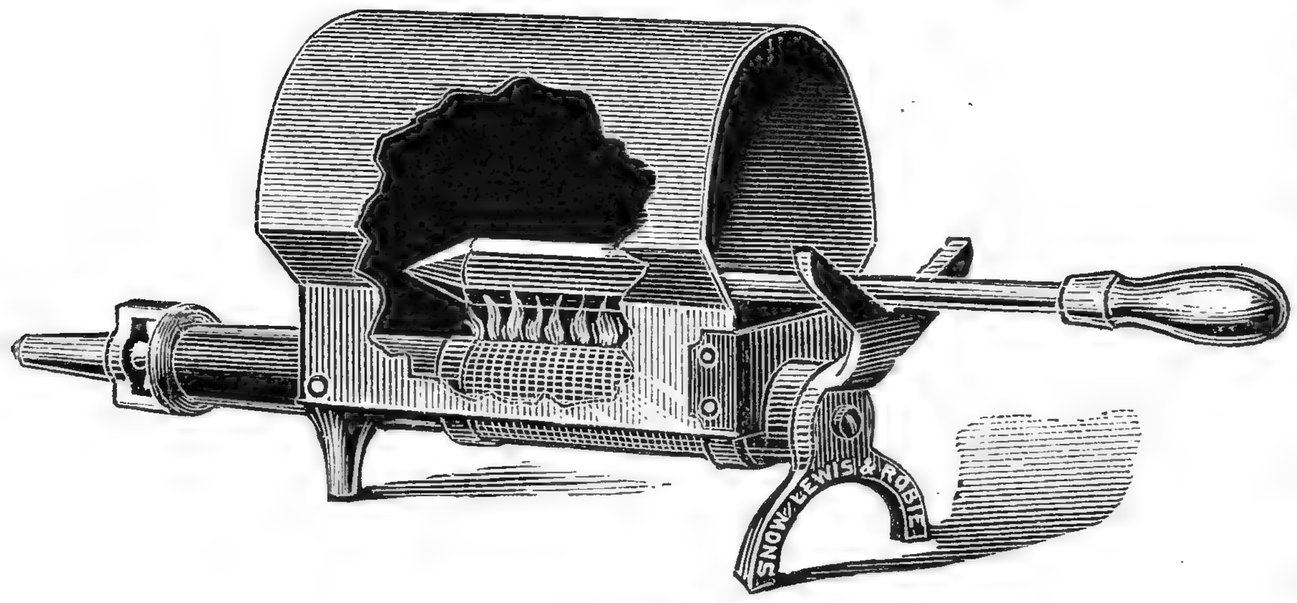
The apertures for air admission have been so arranged that the flame cannot be affected by outside drafts, and there will be no trouble in operating the furnace before an open window. The furnace will hold either one or two soldering bits at once, and heat them evenly.

For illuminating gas, unless natural gas is specified.

PRICE:

No. 18A. Acme Gas Soldering Furnace, ... $2.75
Soldering bit and solder pot not included in price.

No. 18B. SOLDERING BIT HEATER. This resembles the old pattern No. 18 in mode of operation and power, but is of a more simple construction. For illuminating gas unless otherwise specified. No advance in price if ordered for natural gas. Soldering bit not included in price.



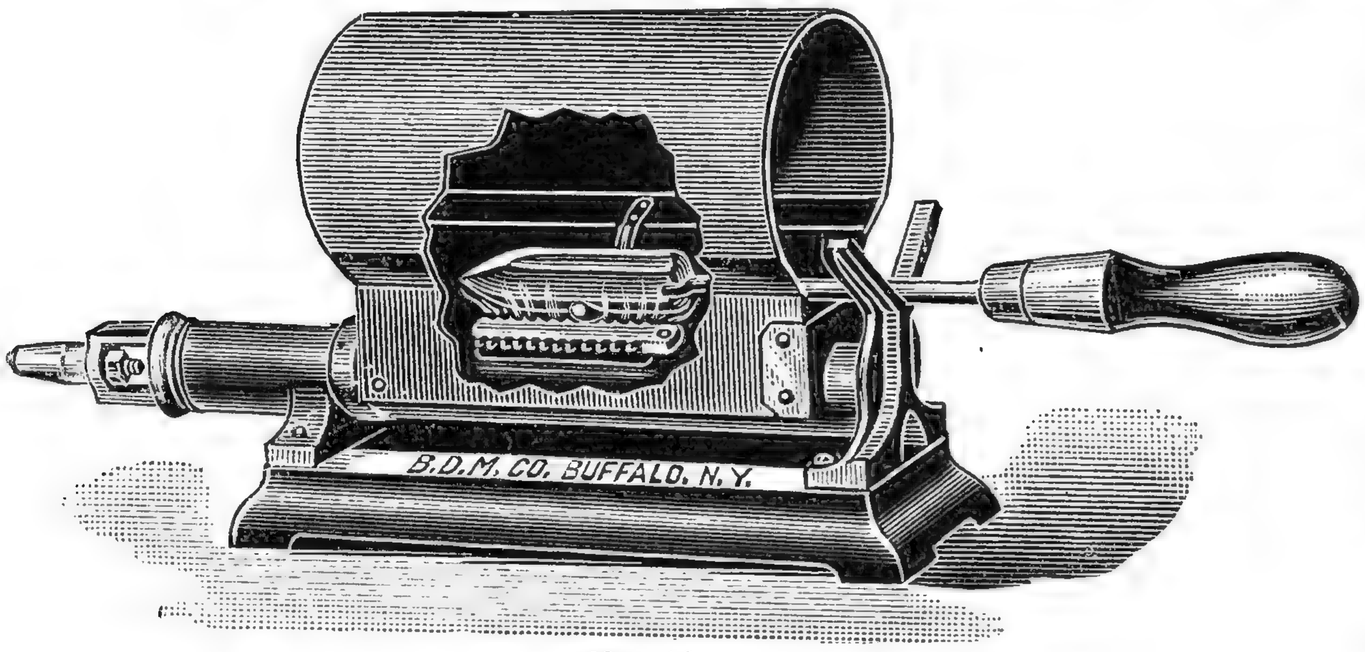
No. 18B

PRICES:

No. 18B. Soldering Bit Heater	$1.25
For Gasoline Gas, with Cap-nut Regulator	1.55
For Gasoline Gas, with Wheel Valve,	2.00

No. 18. EXCELSIOR SOLDERING BIT HEATER. For heating soldering bits for tinners, plumbers, electrotypers, etc. This heater has been in the market for a number of years, and its constantly increasing sales afford the best proof of the esteem in which it is held. It has come to be regarded by tinsmiths as the standard heater for gaseous fuel and has done much to bring the merits of gas into notice as an aid in the workshop.

Maximum consumption of gas, 10 feet per hour.



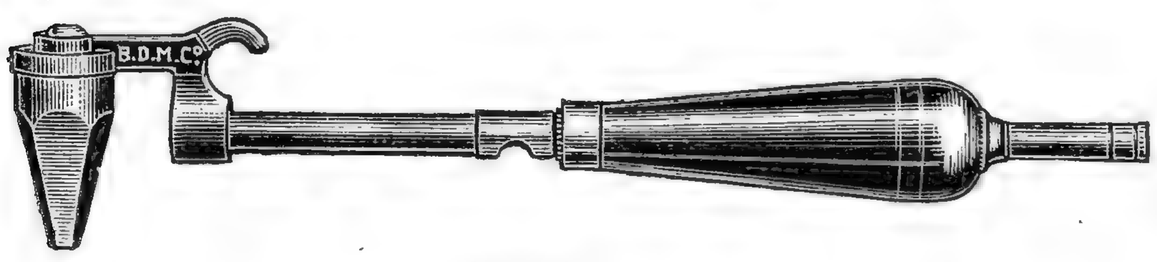
No. 18

For illuminating gas, unless otherwise specified. No advance in price if ordered for natural gas. Soldering bit not included in price.

PRICES:

No. 18. Excelsior Soldering Bit Heater	$1.75
For Gasoline Gas, with Cap-nut Regulator,	2.05
For Gasoline Gas, with Wheel Valve,	2.50

No. 18C. SELF-HEATING SOLDERING BIT. This will be found a useful tool for special work, requiring very little gas, and being fully equal to the requirements of the quickest workman. It is cool to the hand and perfectly clean in use. For illuminating gas only.



No. 18c

PRICE:

No. 18c. Self-Heating Soldering Bit,	$2.00

MUFFLE FURNACE—HARD ENAMELING.

Gentlemen: In answer to your letter I am pleased to say that I have no trouble whatever in fusing hard enamel with your Muffle Furnace. I do not use as much heat as I can get out of your furnace, and I can fuse the hardest enamel.

Yours truly,

July 24, 1905. LAURIN H. MARTIN, Boston, Mass.

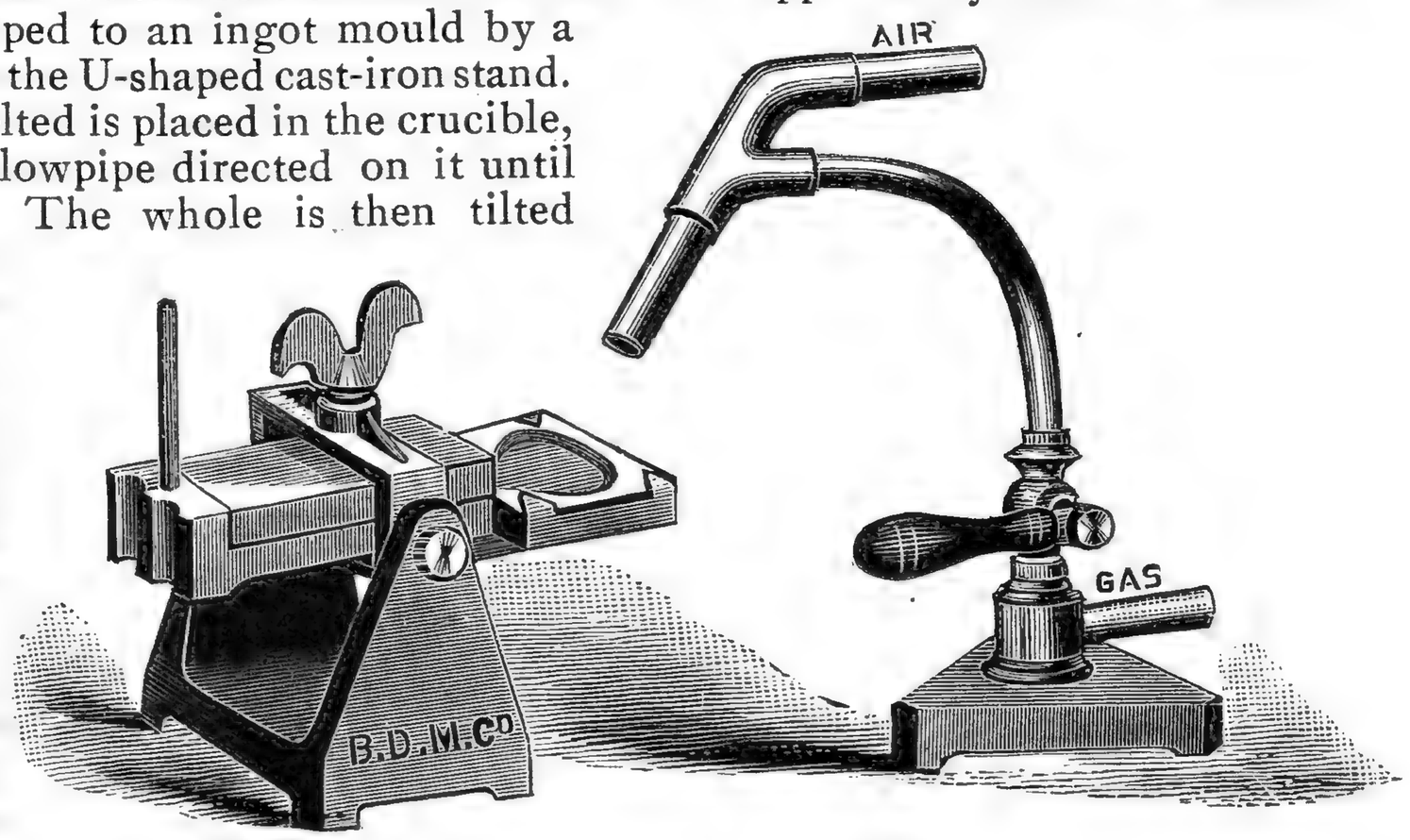
MELTING ARRANGEMENTS

No. 8. MELTING ARRANGEMENT. For illuminating gas only. With the No. 8A Blowpipe. With this apparatus a sound two-ounce ingot of gold or silver can be moulded in two minutes. A crucible of moulded carbon is supported by a sheet-iron slide or plate which is clamped to an ingot mould by a clamp which swivels in the U-shaped cast-iron stand.

The metal to be melted is placed in the crucible, and the flame of the blowpipe directed on it until it is perfectly fused. The whole is then tilted over by means of the upright handle at the back of the mould.

The waste heat serves to make the ingot mould hot. No flux should be used with the Carbon Crucibles.

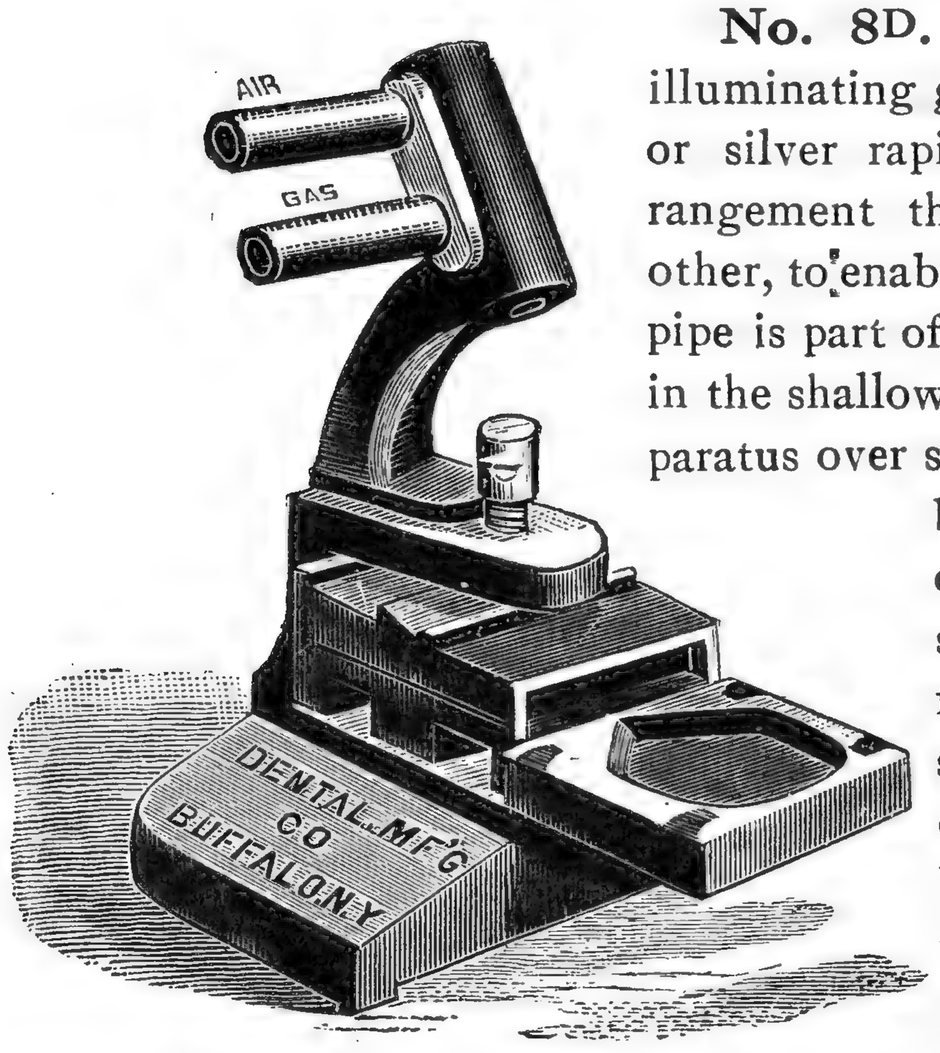
The plate mould will cast an ingot 1⅜ x 1⅜ x $\frac{3}{16}$ inch thick; wire mould $\frac{3}{16}$x$\frac{3}{16}$x2¾ in. long.



No. 8. No. 8A.

PRICES:

No. 8. Melting Arrangement, with both moulds, less blowpipe,	$3.25
No. 8A. Blowpipe, extra,	2.25
Wire Moulds,	1.25
Plate Moulds,	1.25
Extra Carbon Crucibles, without slides, for No. 8, per doz.,	1.00
Extra Carbon Crucibles,with slides, for No. 8. per doz.,	1.75

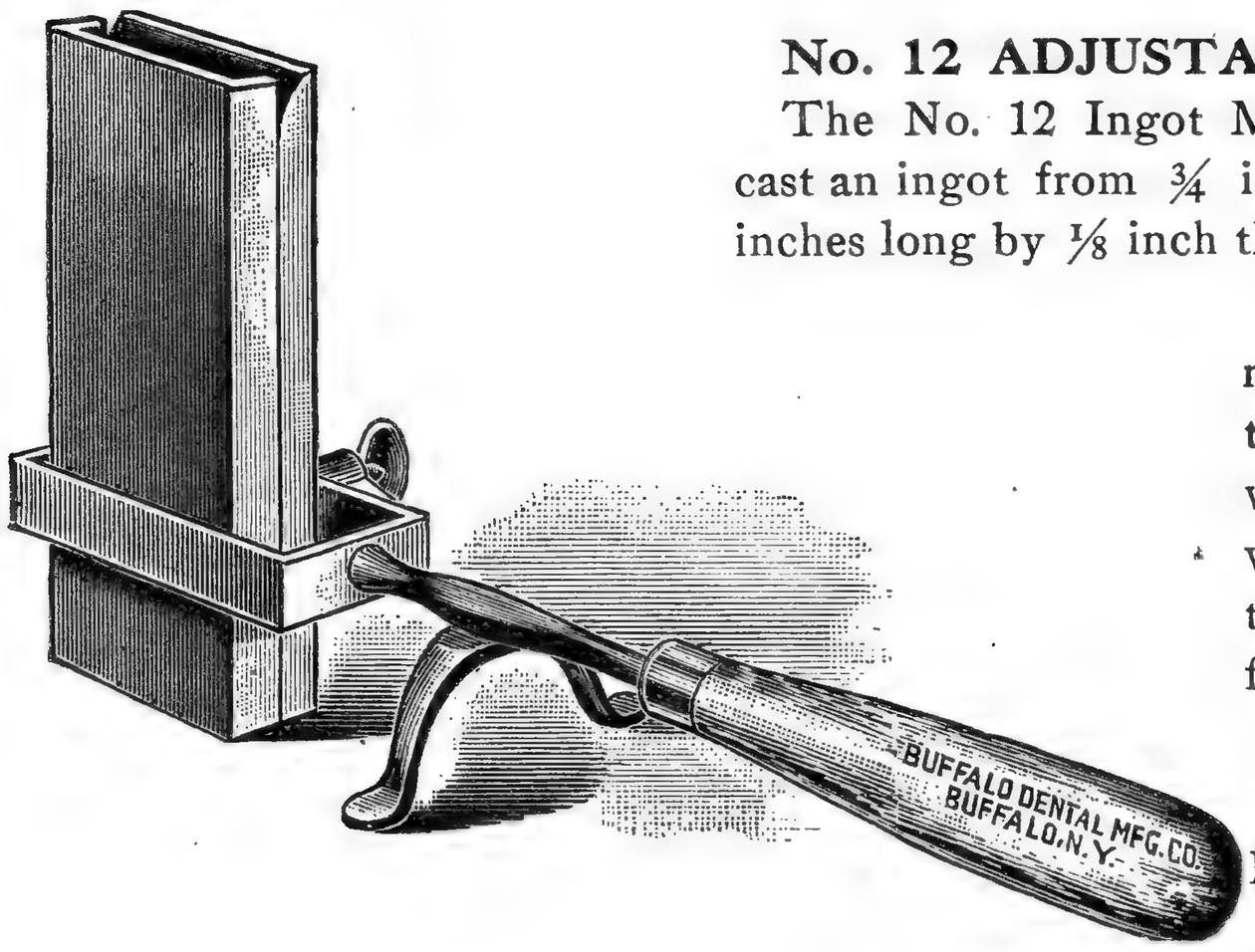


No. 8D

No. 8D. MELTING ARRANGEMENT. For illuminating gas only. For melting up to two ounces of gold or silver rapidly, without the use of a furnace. In this arrangement the two parts of the ingot mould slide on each other, to enable ingots of any width to be cast, and the blowpipe is part of the rocking stand. When the metal is melted in the shallow crucible of moulded carbon, tilt the whole apparatus over so as to fill the ingot mould. A sound ingot can be obtained in about two minutes. Thousands of the No. 8 are in use, but the No. 8D is considered by many as being far superior to any furnace for small work. Very bulky scrap should be run into a mass in one of the moulded carbon blocks before being placed in the crucible. The No. 10A Blower must be used with the No. 8D Melting Arrangement. No. 8D ingot mould will cast an ingot 2 in. long by $\frac{3}{16}$ in. thick, and any width from 1⅝ in. down.

PRICES:

No. 8D. Melting Arrangement, with ingot mould,	$3.00
Ingot Mould, if ordered separately,	1.25
Extra Carbon Crucibles, without slides, for No. 8D, per doz.,	1.00
Extra Carbon Crucibles, with slides, for No. 8D, per doz.,	1.75



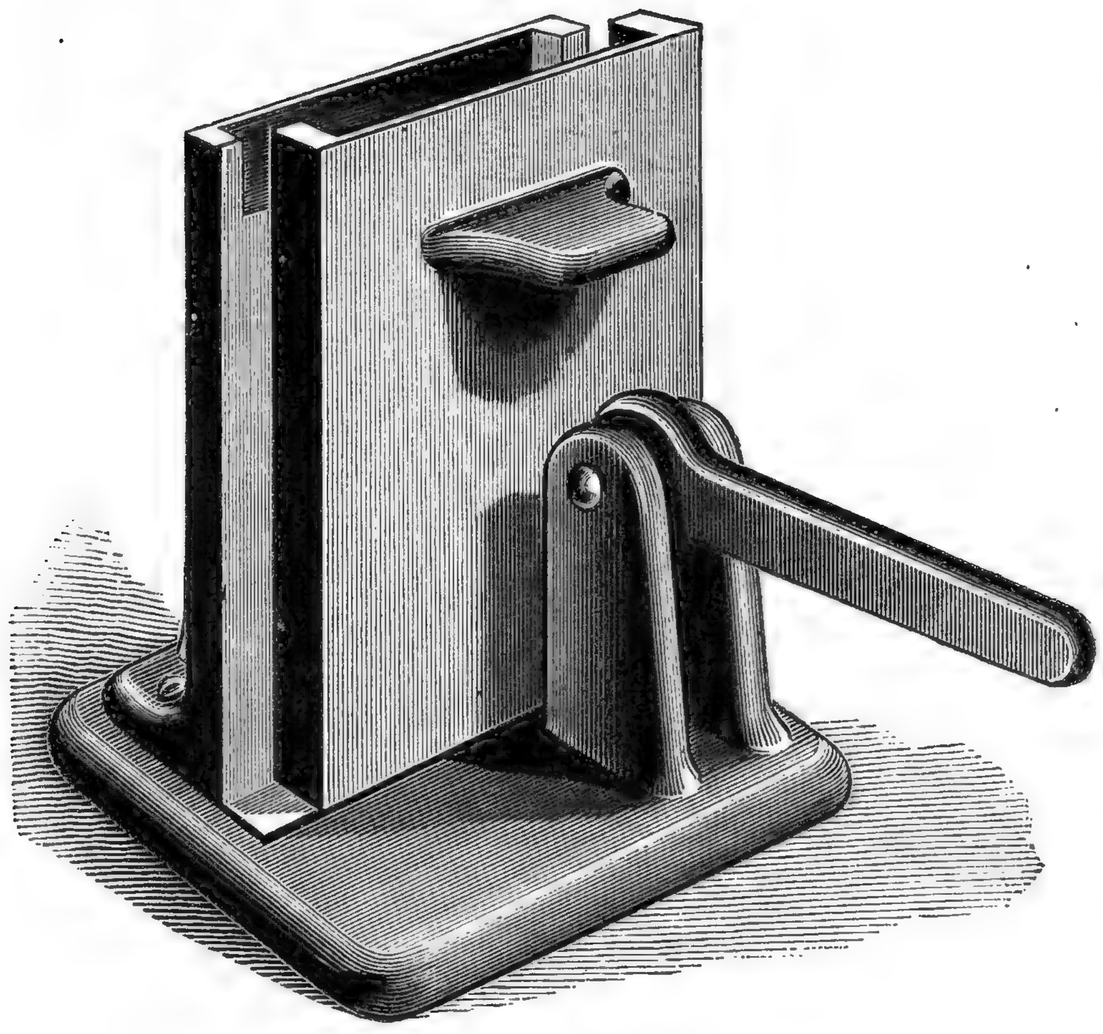
No. 12 ADJUSTABLE INGOT MOULD.

The No. 12 Ingot Mould is adjustable and will cast an ingot from ¾ inch to 1⅜ inches wide by 3 inches long by ⅛ inch thick.

The yoke and support are made of malleable iron and the whole appliance is designed with a view to strength, convenience and facility of operation. It is the ideal mould for casting small ingots.

PRICE:

No. 12. Ingot Mould, $2.00



No. 11 Ingot Moulds.

No. 11 INGOT MOULD.

The bodies of these ingot moulds are well made of close gray iron; the levers of malleable iron. The inside surfaces are milled perfectly smooth, and coated with a compound to prevent the metal adhering to them. They are adjustable sideways, so that any width of metal, from 2¾″ down, can be cast. In ordering, give number of ingot mould and thickness of ingot ⅜″ sent unless otherwise specified.

No. 11. 3″ high, 2¾″ wide, ⅛, or ⅜″ thick. Price, $2.25

No. 11A. 4½″ high, 2¾″ wide, ⅛, ⅜ or ¼″ thick. Price $3.00

No. 11B. 6″ high, 2¾″ wide, ⅛, ⅜ or ¼″ thick. Price, $3.50

¼-oz. 28 Gage 30 33

SILVER SOLDER

MADE IN U. S. OF AMERICA.

BUFFALO DENTAL MFG. CO

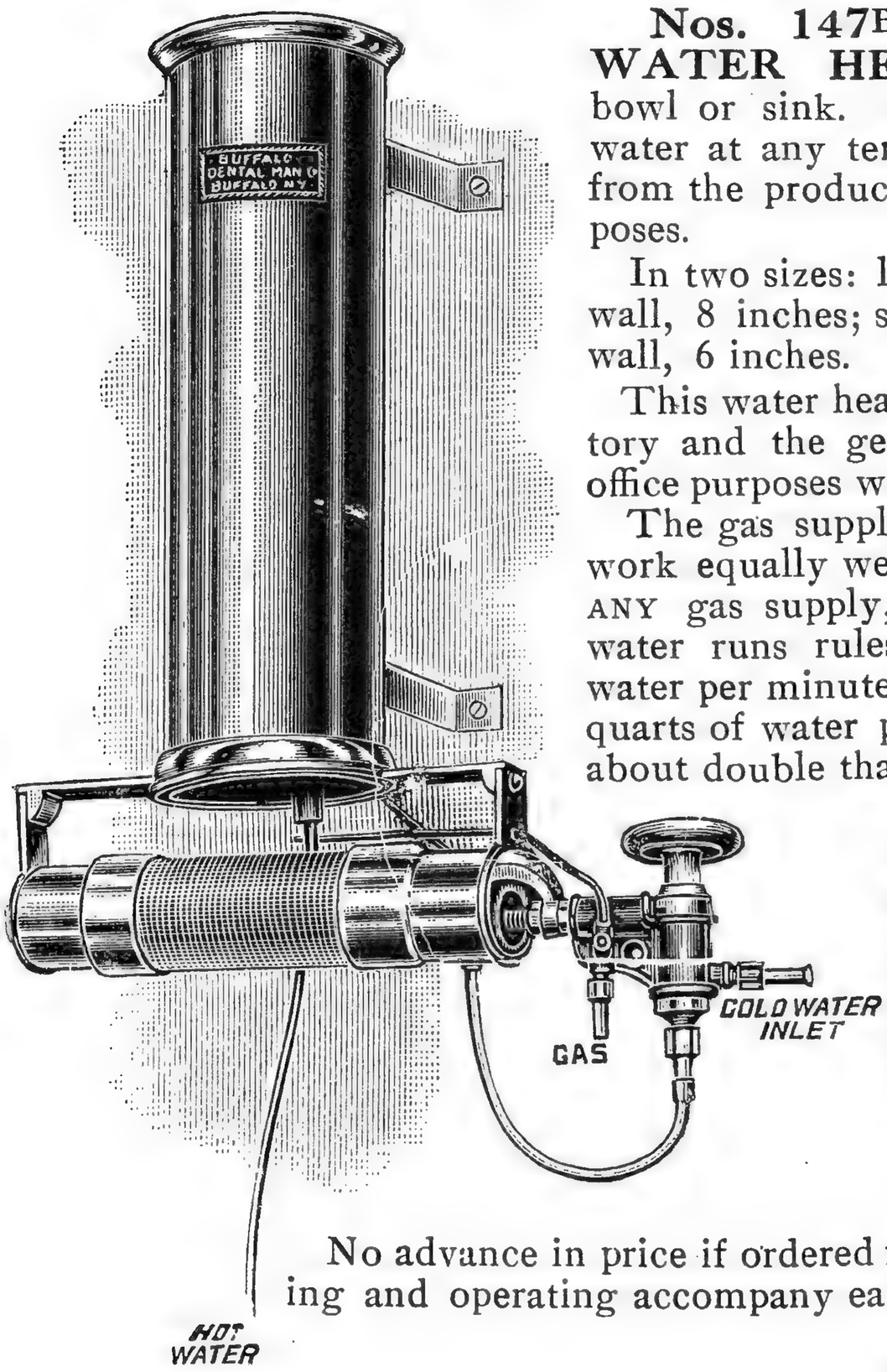
BUFFALO EASY FLOWING SILVER SOLDER.

This Solder is cut in ¼ oz. strips, 2 inches wide; either 28, 30 or 33 gage.

PRICE:

Buffalo Silver Solder, per ¼ oz. strip, ... 25 cents

FLETCHER'S INSTANTANEOUS WATER HEATERS



Nos. 147B AND 147E INSTANTANEOUS WATER HEATER. Designed to hang over lavatory bowl or sink. Giving instantly a continuous supply of water at any temperature from boiling to lukewarm, free from the products of combustion, and suitable for all purposes.

In two sizes: large size, height 19 inches, projection from wall, 8 inches; small size, height 18 inches, projection from wall, 6 inches.

This water heater is more especially intended for the lavatory and the general odd work of laboratory, hospital and office purposes where hot water is constantly wanted quickly.

The gas supply should be from a ⅜-inch pipe. It will work equally well, but at a proportionately lower rate, with ANY gas supply, however small. The speed at which the water runs rules its temperature. It will heat one pint of water per minute from 50° to 130° Fahrenheit, or will boil 15 quarts of water per hour. The duty of the larger size is about double that above given.

It is not designed for baths. Consumption of gas: large size 40 feet, small size 20 feet per hour. These heaters are supplied with pilot light and a coupled gas and water tap, operated by a hand wheel, a turn of which lights the burner and gives an immediate flow of warm water. Made entirely of brass and copper, polished and nickel plated.

Fitted to burn illuminating gas, unless otherwise specified.

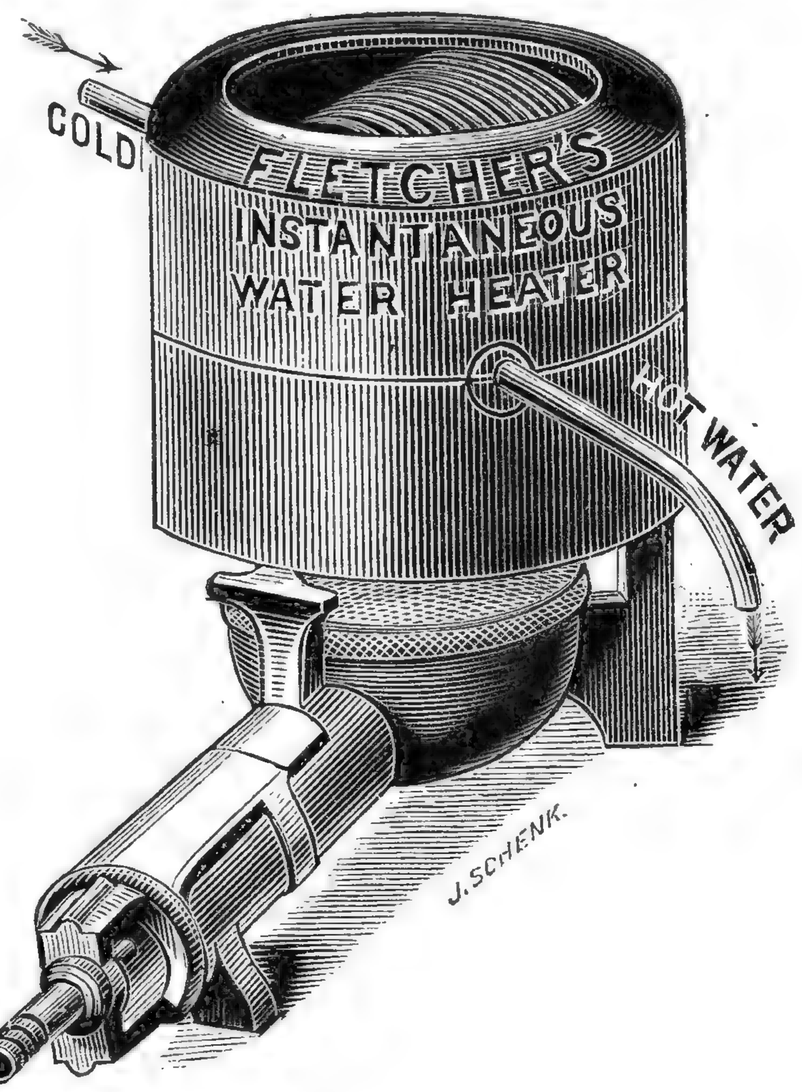
No advance in price if ordered for natural gas. Full instructions for installing and operating accompany each heater.

PRICES:

No. 147B. Water Heater, small size, with coupled taps and pilot light . .	$25.00
No. 147E. Water Heater, large size, with coupled taps and pilot light, . . .	30.00
For Gasoline Gas, extra, ...	1.00

No. 247. INSTANTANEOUS WATER HEATER. An attachment to the Fletcher Burner No. 47. Total height 9 inches. This gives, when connected with a water tap, hot water in three seconds after the gas is lighted, either boiling, hot, warm or cold, the water being pure and fit for cooking purposes. In one minute it will deliver sufficient hot water for washing hands. It is simple, cheap, not liable to get out of order or wear out, and is nearly equal in power to the small size No. 147 Instantaneous Water Heater. Gas supply required, ⅜-inch clear bore pipe and tap, to obtain the maximum power, at which it consumes about 25 feet per hour. It will work at a proportionate rate with any gas supply, however small.

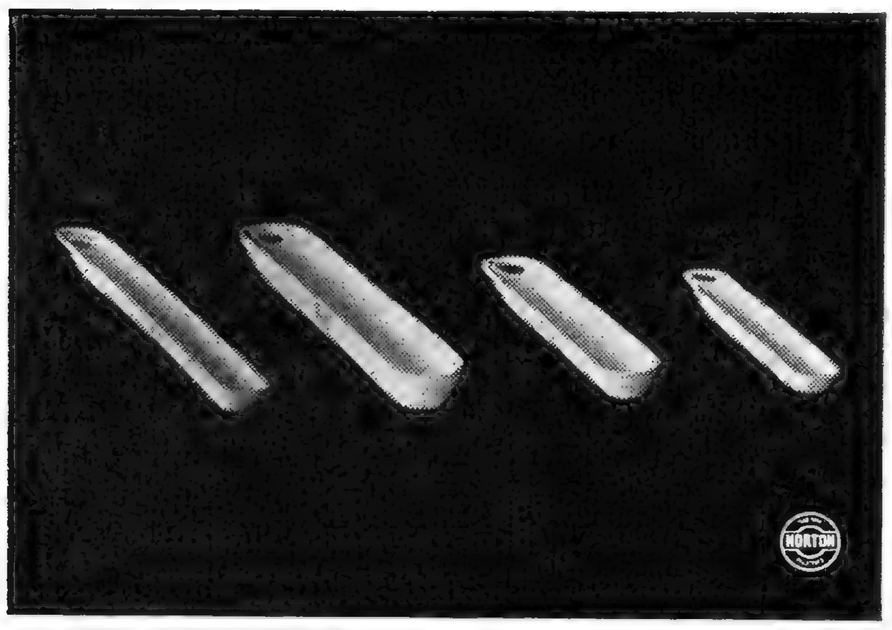
If frequently used for long periods in a confined room, the products of combustion should be carried away. For illuminating gas unless otherwise specified. No advance in price for altering to natural gas.



PRICES:

No. 247. With burner complete, as shown, ...	$6.00
No. 247. Water Heater, without burner, ...	4.00
For Gasoline Gas, with wheel valve, ...	6.95

ALUNDUM COMBUSTION BOATS. ALUNDUM, the material from which these combustion boats are made, is one of the most refractory of the common oxides. It has a hardness greater than corundum, and a fusing point above 2000° Centigrade. It is very inactive toward fluxes, slags, etc., and has a low coefficient of expansion, approaching that of fused quartz. It will be readily appreciated that this substance is most desirable for use in the manufacture of articles which are subjected to high temperatures, and which are cooled suddenly; as the life of such articles is more than trebled.



We can now supply Alundum Combustion Boats in the following sizes:

PRICES:

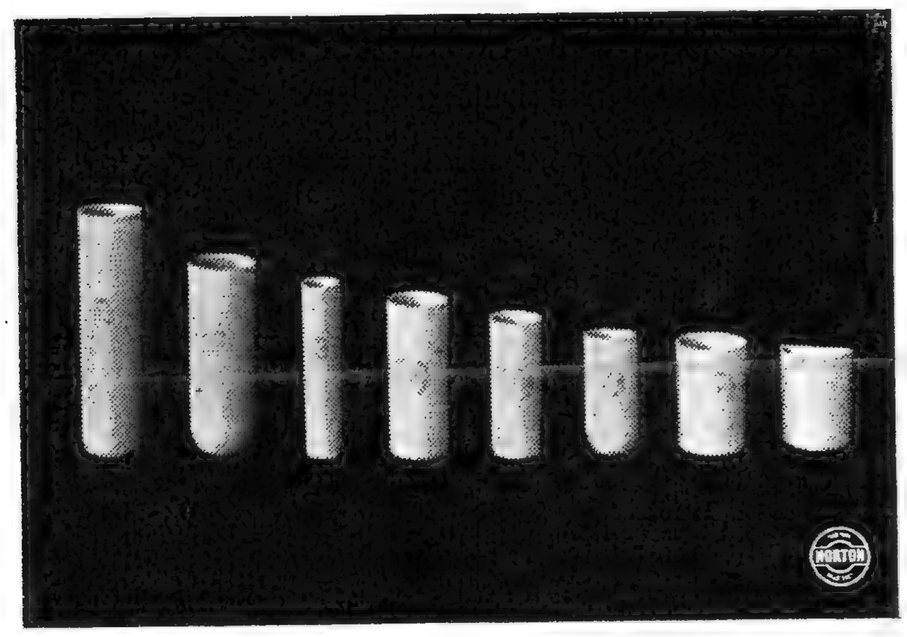
No. 0, ½-in. wide, 3½-in. long, $\frac{5}{16}$-in. deep, ... 30 cents each.
No. 1, ⅝-in. wide, 3¾-in. long, $\frac{5}{16}$-in. deep, ... 35 cents each.
No. 2, ¾-in. wide, 5-in. long, ⅜-in. deep, ... 40 cents each.
No. 3, ½ in. wide, 5½-in. long, $\frac{5}{16}$-in. deep, ... 40 cents each.

Prices on special shapes and sizes in Muffles, Domes, Crucibles; Combustion Furnace Channels, Combustion Boats, etc., will be quoted on request.

R. R. ALUNDUM. This is a very pure Crystalline Alumina, and is supplied in grain form of Nos. 60, 90 and 120 mesh, for use in the determination of carbon in steel.

It is used in connection with combustion boats made of platinum and siliceous materials such as porcelain or fire-clay, and is also recommended for Alundum Boats, to increase their durability, and to prevent their destruction during combustion. A layer of about ⅛" thickness is spread over the bottom of the boat and on this is placed the sample of borings or chips to be analyzed. It prevents the metal from coming in contact with and fluxing the boat, which can be used repeatedly. R. R. Alundum is carefully prepared, special attention being given to the removal of carbon, so that blank determinations are unnecessary. Put up in glass stoppered bottles at the following prices: ½ lb. bottle 40c; 1 lb. bottle 75c; 2 lb. bottle $1.50.





ALUNDUM EXTRACTION THIMBLES.

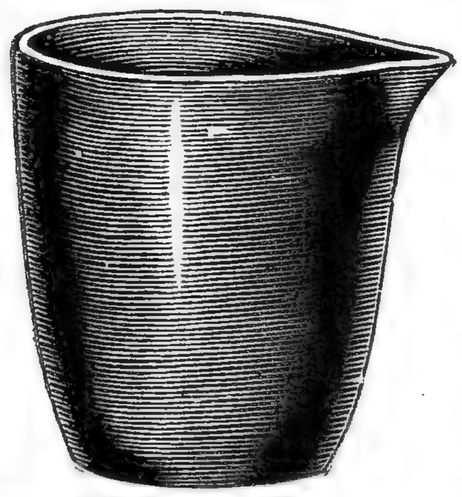
No.	Shape	Dia.	Height	Price
5916	Semi-circ.	32 mm	51 mm	$0.40
6229	Flat bot.	35 mm	55 mm	.50
6691	Round bot.	26 mm	60 mm	.40
5163	Flat bot.	25 mm	70 mm	.40
5811	"	30 mm	80 mm	.45
6389	"	19 mm	90 mm	.50
6406	Round bot.	34 mm	100 mm	.60
6486	Oval bot.	32 mm	127 mm	.75
6945	Round bot.	45 mm	127 mm	1.00

For the extraction of soaps, fats, foods, rubber, etc., by both organic and inorganic solvents, Alundum Extraction Thimbles offer the advantage of being rapid, practically indestructible and readily cleansed by ignition.

Various other styles of extraction thimbles are furnished for special work.

PLUMBAGO AND CLAY FITTINGS

PLUMBAGO CRUCIBLES. These Crucibles are round, with pouring lip, of good quality, made from our own patterns, and designed especially for the Fletcher Gas Furnaces.

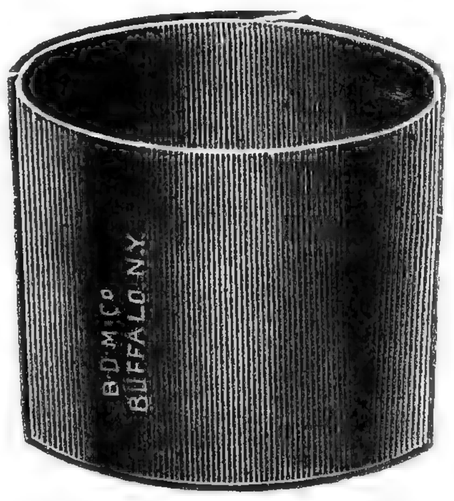


PRICES:

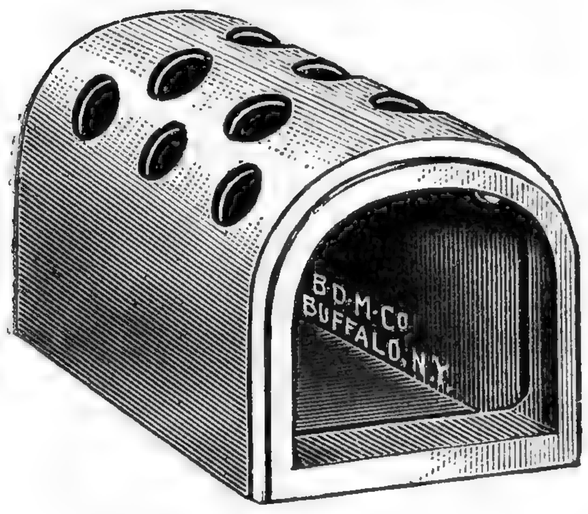
No. 00.	2 in. diam.,	2¼ in. high, capacity ½ lb.,	. 27 cents
No. 0.	2⅜ in. diam.,	2½ in. high, capacity ¾ lb.,	. 27 cents
No. 1.	2½ in. diam.,	3 in. high, capacity 2 lb.,	. 30 cents
No. 2.	2¾ in. diam.,	3½ in. high, capacity 4 lb.,	. 32 cents
No. 3.	3¾ in. diam.,	4 in. high, capacity 6 lb.,	. 38 cents
No. 6.	4½ in. diam.,	6½ in. high, capacity 12 lb.,	. 60 cents
No. 8.	5¾ in. diam.,	7⅛ in. high, capacity 24 lb.,	. 75 cents

Crucible Covers, Clay per doz., . . . $0.75

Three sizes, 3⅝, 2⅞, 2¼ in. diameter.

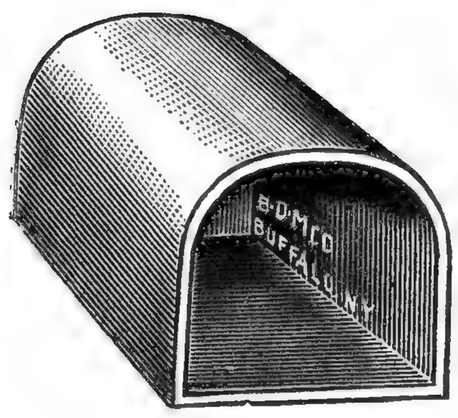


Plumbago Cylinders for No. 15 Furnace, ... $1.00



PRICES FOR PLUMBAGO DOMES

Plumbago Domes for No. 3 Muffle Furnace, . . .	$1.00
Plumbago Domes for No. 4 Muffle Furnace, . . .	1.25
Plumbago Domes for No. 5 Muffle Furnace, . . .	1.50
Plumbago Domes for No. 6 Muffle Furnace, . . .	2.50



PRICES FOR PLUMBAGO MUFFLES:

No. 3 Muffles, 3 x 4 x 2⅜ inches high inside, . . .	$1.00
No. 4 Muffles, 3⅞ x 5⅞ x 3 inches high inside, . .	1.25
No. 5 Muffles, 4⅞ x 6⅝ x 4 inches high inside, . . .	1.50
No. 6 Muffles. 6 x 8½ x 4⅞ inches high inside, . . .	2.50
Nos. 141 or 241 Muffles, ...	1.50

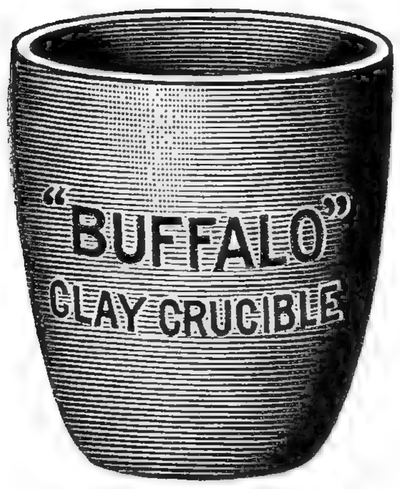
Clay Muffles are in stock, at same prices as are given above.

CLAY ASSAY CRUCIBLES. For Melting Gold.—These are smooth and of the correct porosity.



PRICES:

	Diam.	Height.	Per Doz.
Size A, ...	1⅛ inch,	1⅛ inch,	$1.80
Size B, ...	1¼ inch,	1¼ inch,	1.80
Size C, ...	1¾ inch,	1½ inch,	1.80
Size D, ...	1¾ inch,	2 inch,	1.80



"BUFFALO" CLAY CRUCIBLES. These Crucibles are from our own patterns, designed for our gas furnaces and are confidently recommended as equal, if not superior, to the best Clay Crucibles heretofore produced. They have been thoroughly tested and are found to stand very high temperatures. Use them when Plumbago Crucibles are undesirable or too expensive.

Buffalo Clay Crucibles are made without a pouring lip, as illustrated.



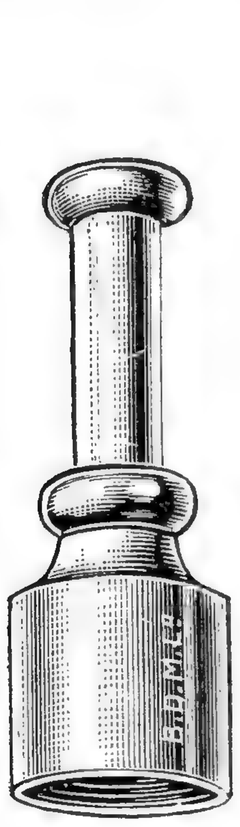
PRICES:

No. 00.	2 in. diam.,	2¼ in. high, capacity ½ lb.,	8 cents
No. 0.	2⅜ in. diam.,	2½ in. high, capacity ¾ lb.,	9 cents
No. 1.	2½ in. diam.,	3 in. high, capacity 2 lb.,	10 cents
No. 2.	2¾ in. diam.,	3½ in. high, capacity 4 lb.,	15 cents
No. 3.	3¾ in. diam.,	4 in. high, capacity 6 lb.,	20 cents

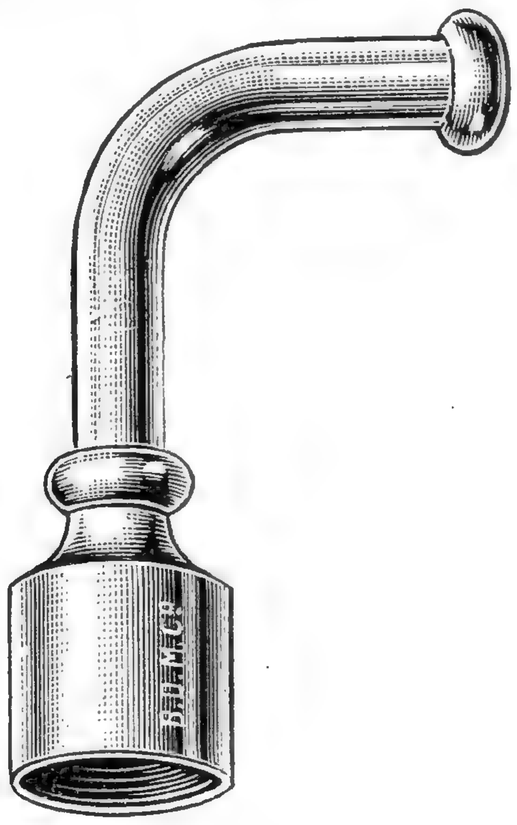
Clay Cylinders for No. 15 Furnace, ... $0.50

FITTINGS FOR LABORATORY BENCHES

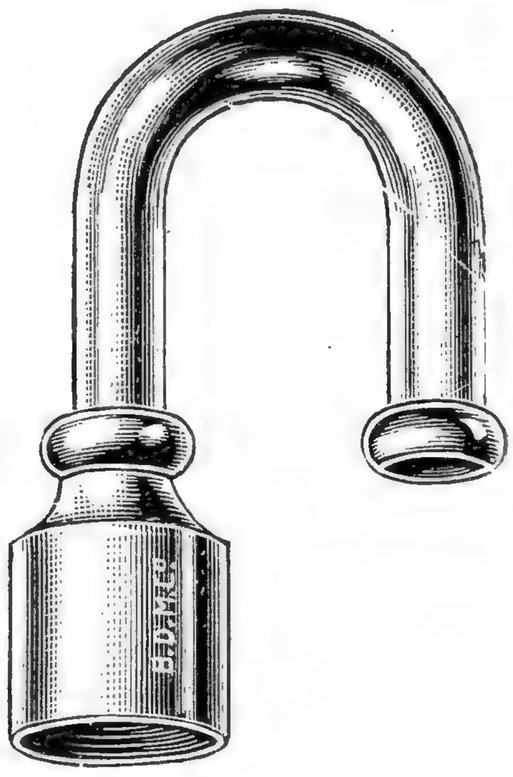
No. 117. BRASS CONNECTIONS. These connections are made of brass, polished and designed to be secured on the gas fixture openings for attachment of rubber tubing leading to blowpipes, Bunsen burners or gas heating burners. In situations where a gas pipe runs at the back of the bench and parallel with it, the No. 116 gas tap is preferable, attaching the female end to the pipe, and the brass connection desired to the male end. Illustrations are full size.



No. 117.



No. 117A.



No. 117B.

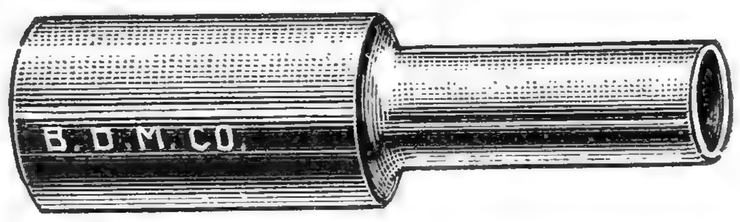
PRICES:

No. 117.	Brass Connection, straight, ...	20 cents
No. 117A.	Brass Connection, quarter turn, ...	30 cents
No. 117B.	Brass Connection, half turn, ...	30 cents

No. 118. BRASS REDUCER. The reducer is made of brass and is to reduce the size of rubber connecting tubing from ⅜ or $\frac{5}{16}$ inch to $\frac{3}{16}$ inch. The ends are not threaded. Illustration full size.

PRICE:

No. 118. Brass Reducer, ... 10 cents

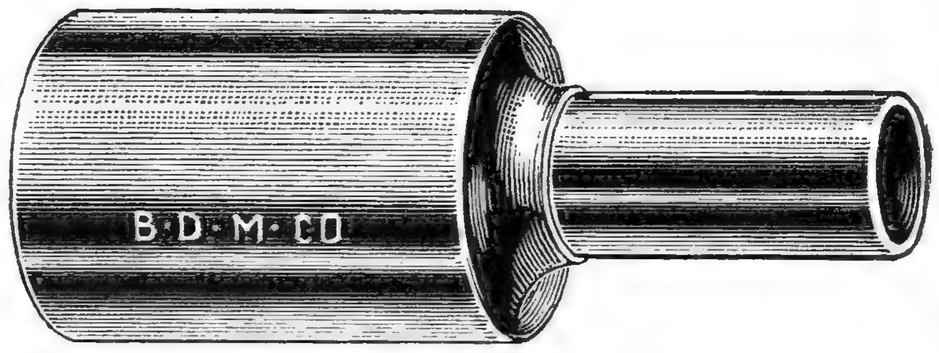


No. 118

No. 118A. BRASS REDUCER. For use in reducing from ½ inch or ⅝ inch rubber tubing to $\frac{5}{16}$ or ⅜ inch. Not threaded. Illustration full size.

PRICE:

No. 118A. Brass Reducer, . . . 40 cents

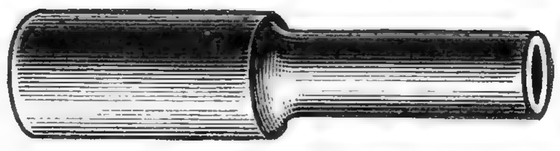


No. 118A.

No. 118B. BRASS REDUCER. For use in reducing from $\frac{5}{16}$ inch or ¼ inch rubber tubing to $\frac{3}{16}$ inch. Illustration full size.

PRICE:

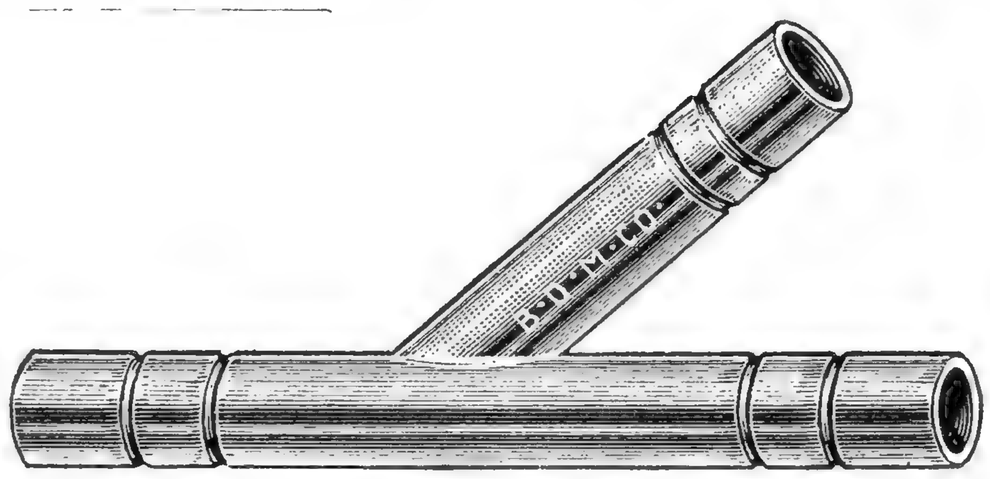
No. 118B Brass Reducer, ... 10 cents


No. 118B.

No. 119. BRASS Y CONNECTION. For branching off with rubber tubing from a straight connection. Outside diameter of Y, ⅜ inch. Will take down to ¼ inch rubber tubing. Not threaded. Illustration two-thirds size.

PRICE:

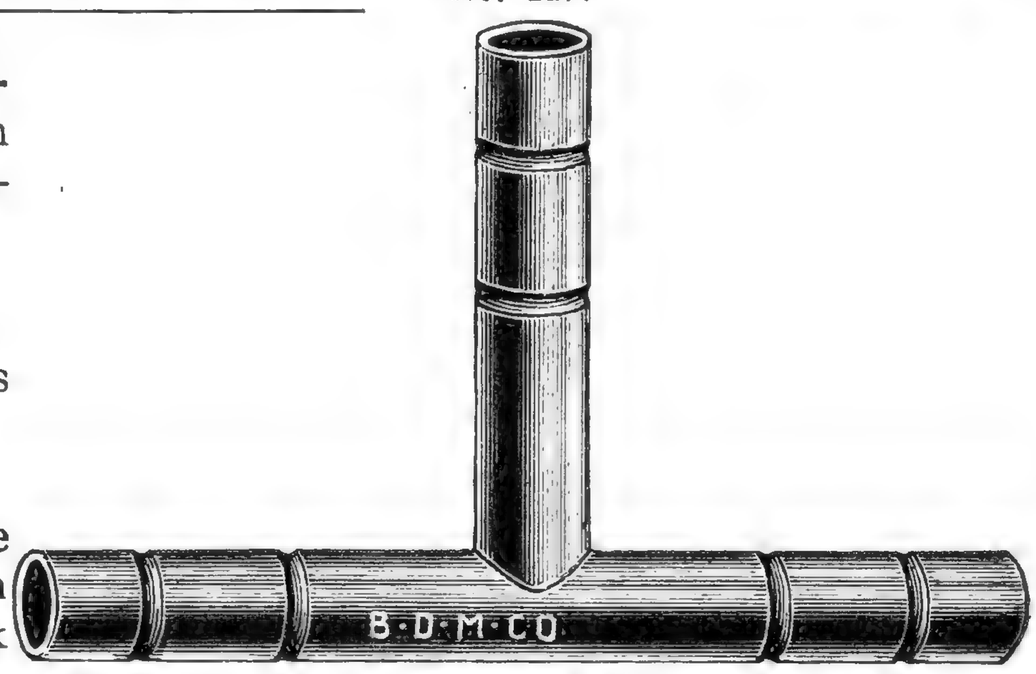
No. 119. Brass Y Connection, 30 cents


No. 119.

No. 119A. BRASS T CONNECTION. For connecting ¼ inch rubber tubing. Not threaded. Illustration full size.

PRICE:

No. 119A. Brass T Connection, 30 cents



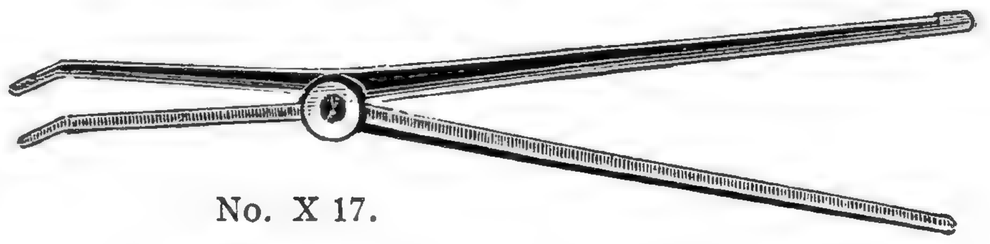
No. 119A.

CRUCIBLE TONGS. Malleable iron; a very neat pattern. Useful in stick soldering and for handling work when hot.

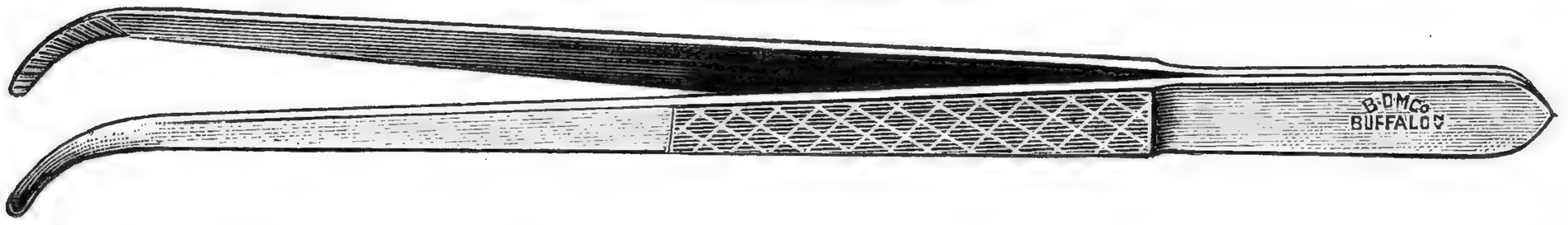
PRICES:

No. X12, 12-in. Crucible Tongs, 40 cents
No. X17, 17-in. Crucible Tongs, 50 cents

In ordering, denominate as No. X12 or No. X17.


No. X 17.

SOLDER TONGS.



Heavy Steel Tongs, for soldering and general laboratory purposes. Rough nickel.

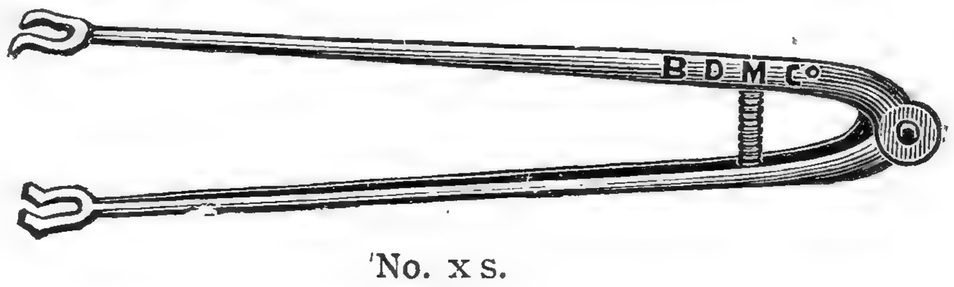
PRICES:

No. 176. Solder Tongs, 9 inch, ... 60 cents
No. 176A. Solder Tongs, 12 inch, ... 65 cents

SCORIFIER TONGS. Malleable iron; new pattern. Length, 17¼ inches.

PRICE:

No. XS, Scorifier Tongs, . . 75 cents



No. XS.

GAS SUPPLY TAPS.

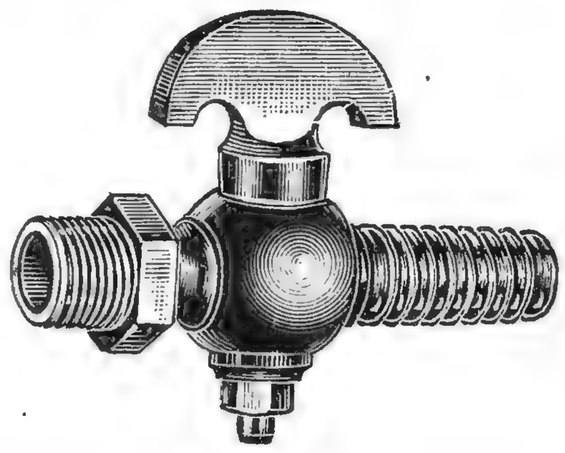
Taps for gas should be what are known as main cocks, with a large way through. These we supply, with nozzle for rubber tubing ⅜-inch or ½-inch bore, and a clear passage of the full size specified.

When gas is used for heating burners or draft furnaces, it is very important that it should be delivered at full pressure; and to secure this end the supply pipes should be of ample size. When laying pipes, it costs but little additional to put them in a size or two larger than is thought necessary at the time, and the efficiency which will be secured thereby, when the apparatus is put into operation, will abundantly repay the additional outlay; especially is this the case when gasoline gas is used. This varies so much in quality that it is necessary, when the gasoline is old and heavy, to supply six or seven times the quantity of gas to the burner to produce the same result that is required when the gasoline is fresh and volatile. It is therefore absolutely essential that the supply pipe should be very large when gasoline gas is used.

No. 114. For attaching to gas pipes by means of ordinary fittings.

PRICES:

No. 114.	⅜-in. clear bore,	$1.15
No. 114.	½-in. clear bore,	1.25

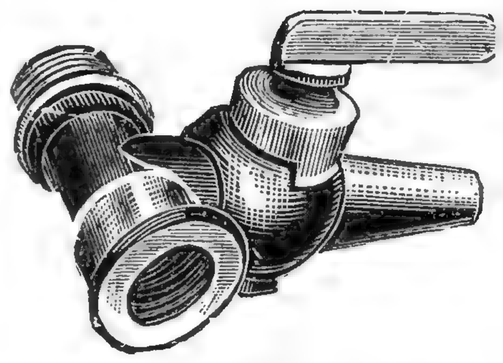


No. 114.

No. 115. A ⅜-inch clear way tap, with T branch for connection between an ordinary gas bracket and the main pipe, to take off gas for heating purposes without interfering with the use of the bracket for light.

PRICE:

No. 115. Gas Tap, ... $1.50

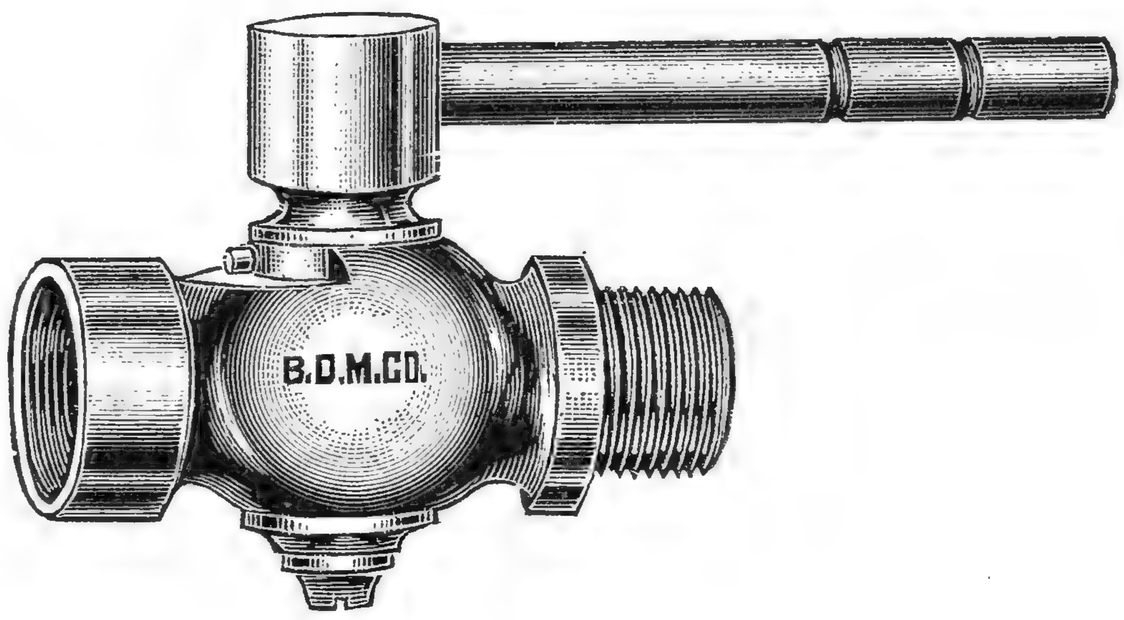


No. 115.

No. 116. This tap is nicely made and threaded on the female end to be attached to ⅛-inch gas pipe, or any ordinary gas fixture. The male end is threaded to receive any of the No. 117 brass connections.

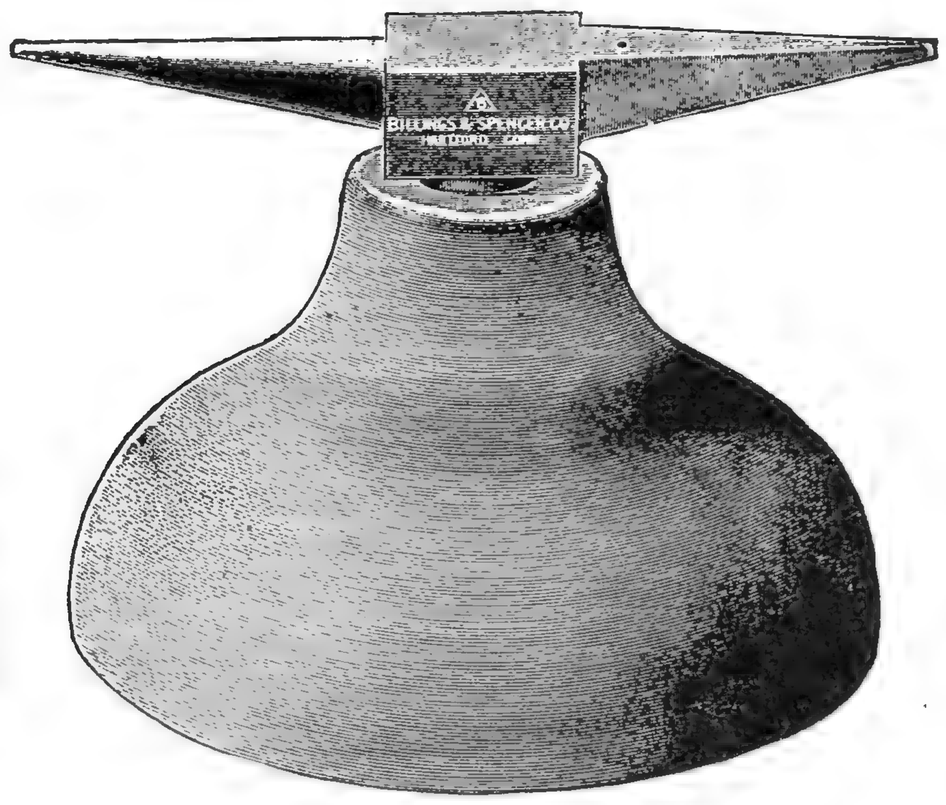
PRICE:

No. 116. Gas Tap, . 60 cents

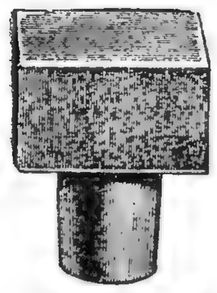


No. 116.

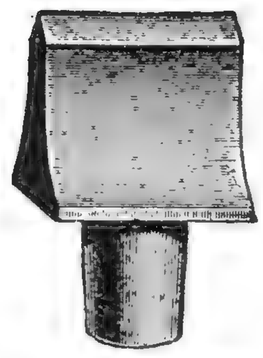
INTERCHANGEABLE ANVIL. For Jewelers, Dentists and General Laboratory Purposes. The base is drop-forged steel, polished and nickel plated. Both the Anvil and the Cutter or Hardie are drop-forged steel, properly hardened. The base has a loose pin projecting from its under side in line with shank of anvil. A slight blow upon this pin dislodges the Horn Anvil when it is desired to replace it with either the Square Anvil or Hardie. The change is effected in an instant.



Base with Horn Anvil.



Square Anvil.



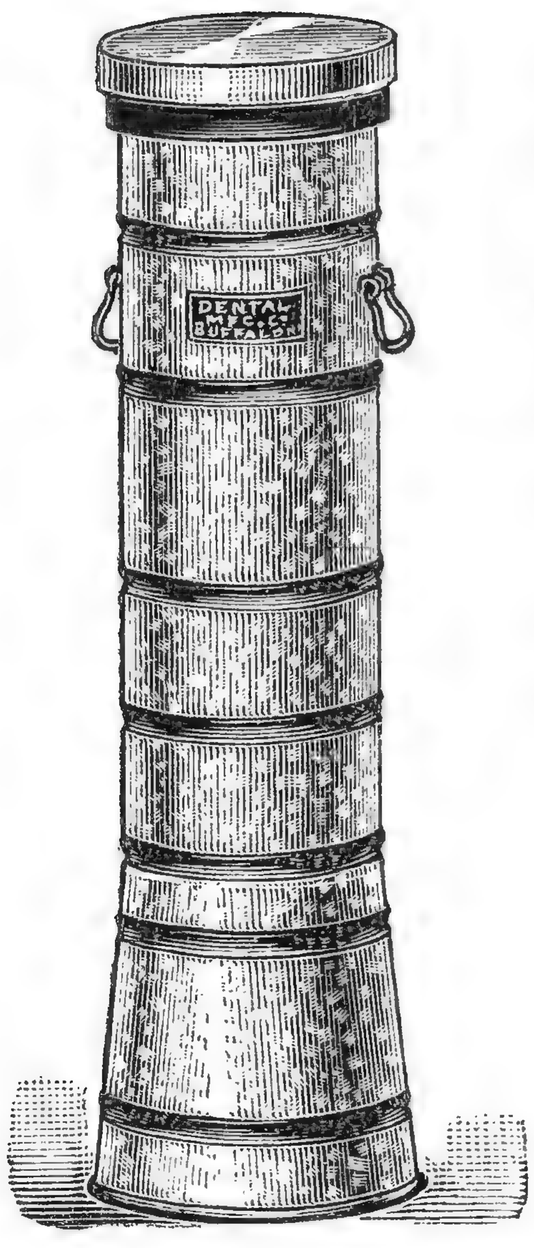
Cutter or Hardie.

This is by far the best made and finished Anvil on the market, and should not be classed with the cheap and roughly made anvils of foreign make. The anvils are made by the Billings & Spencer Co., of Hartford, whose name is a guarantee of excellence.

Illustrations are two-thirds size.

PRICE:

No. 3 Anvil, complete; Base, with Horn Anvil, Square Anvil and Cutter, . $2.00



No. 113. ANVIL. This is a 22-lb. anvil resting on sand and useful for swaging and other workshop purposes, crushing small specimens of ore, etc.

The Casing is made of heavy galvanized iron and reinforced on the top by a wrought iron ring. Handles are placed on the side of the casing for convenience of moving from place to place. It is filled to the top with clean lake sand to take the force of the blow, the anvil resting on the sand and not on the casing.

The Anvil is cast iron, 6¾ inches diameter, turned and polished, and weighs 22 lbs. Total height, 28 inches; total weight, including sand, 100 lbs.

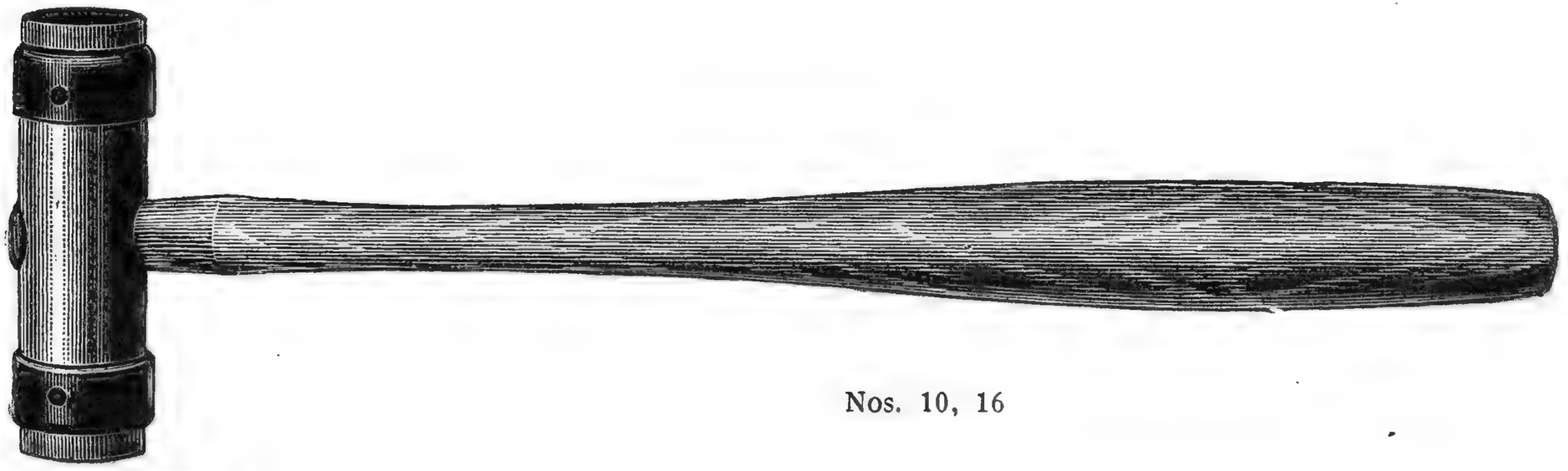
Sand always supplied unless orders are to the contrary.

PRICES:

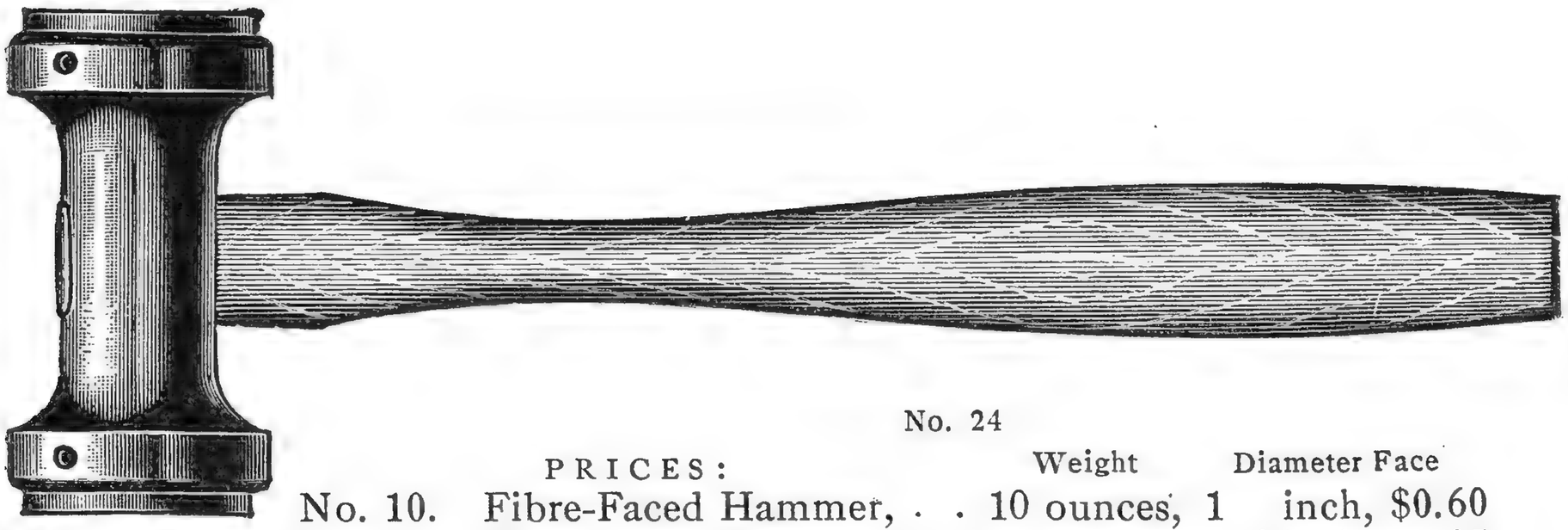
No. 113. Swaging Anvil,	$6.50
No. 113A. Swaging Anvil, with casing japanned and striped,	8.00
Anvil Block, alone,	5.00
Stand, alone,	2.00

Nos. 10, 16, 24. FIBRE-FACED HAMMERS. The body is of malleable iron with removable vulcanized fibre face, held in place by a flanged steel ring. When necessary to replace worn-out faces, the steel ring may be unscrewed by means of a spanner wrench furnished for the purpose, and a new fibre face, costing but a few cents, inserted, the change being effected in a few seconds. Each hammer is supplied with a stout hickory handle, and the metal parts are well finished.

The fibre faces serve to produce an elastic blow and protect from injury the object upon which the blow is delivered. Fibre-faced hammers are desirable for swaging and other purposes, and the three sizes offered are believed to meet every necessity of the laboratory or workshop.



Nos. 10, 16



No. 24

PRICES:

		Weight	Diameter Face	
No. 10.	Fibre-Faced Hammer, . .	10 ounces,	1 inch,	$0.60
No. 16.	Fibre-Faced Hammer, . .	16 ounces,	1¼ inch,	.85
No. 24.	Fibre-Faced Hammer, . .	24 ounces,	1¾ inch,	1.10

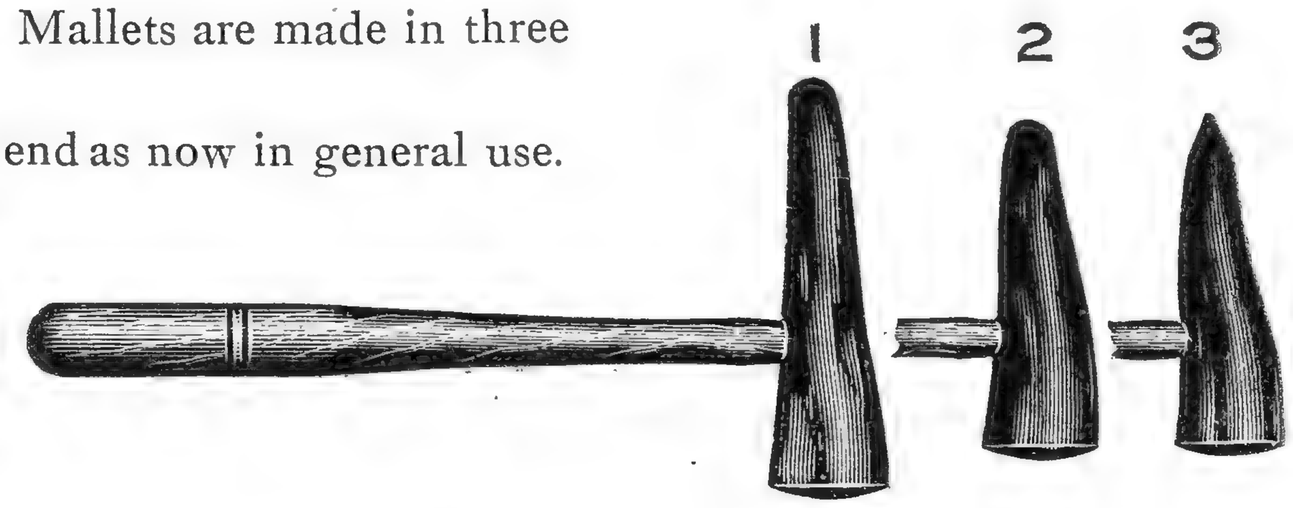
Extra fibre faces, per dozen pairs, No. 10, 50 cents; No. 16, 75 cents; No. 24, $1.00.

"BUFFALO" HORN MALLETS. Two New Patterns. The heads of Buffalo Dental Mfg. Co. Horn Mallets are as straight as can be procured. The horn is carefully selected, handles and heads are well finished, and the heads are securely pinned to the handles.

B. D. M. Co.'s Horn Mallets are made in three shapes, as follows:

No. 1, with long-pointed end as now in general use.

No. 2, with small end shortened and blunt to readily reach the margins. The smaller diameter will be found desirable also for use on small jewelry.



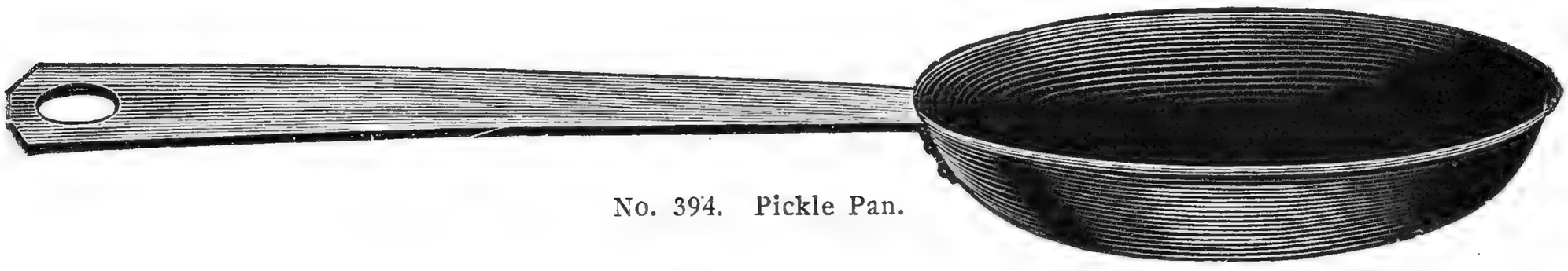
No. 3, with small end shortened and made V-shaped. This shape is designed to overcome the tendency to dent the metal and is especially useful for swaging over the margins.

PRICE:

"Buffalo" Horn Mallets, Nos. 1, 2 or 3, each, ... 40 cents

COPPER PICKLE PANS.

No. 394. For boiling out gold work after soldering. Shallow and of light copper.

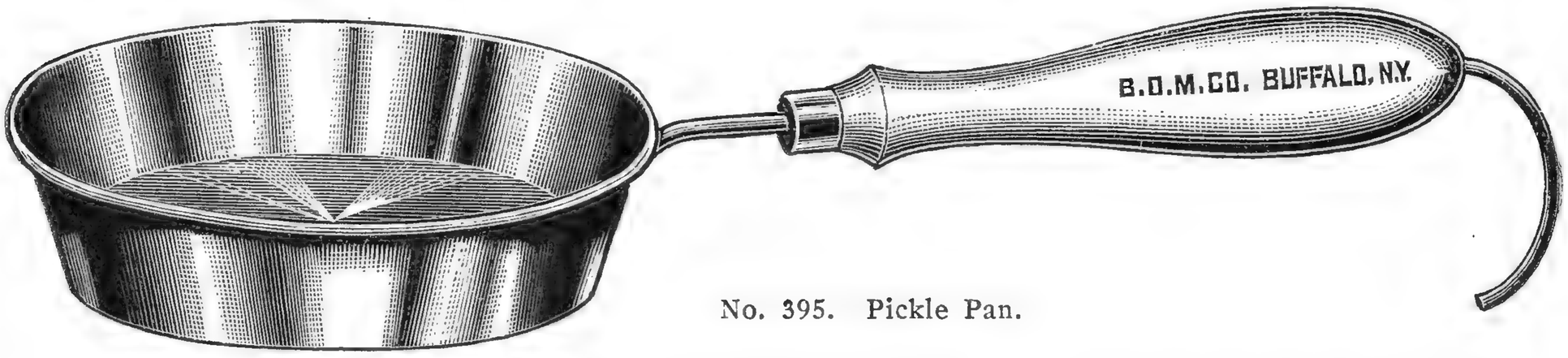


No. 394. Pickle Pan.

PRICE:

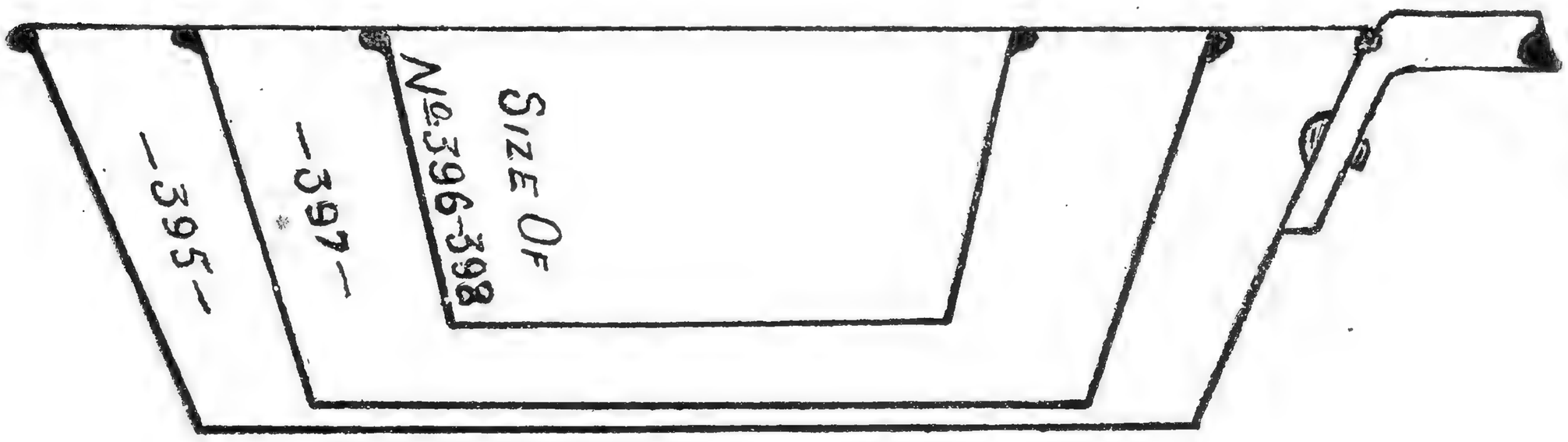
No. 394. Copper Pickle Pan, 3½ inches diameter, ... 40 cents

Nos. 395, 396, 397 and 398 Pickle Pans. The shape of the Pickle Pans and Melting Ladles of this series is shown in illustration of No. 395 Pickle Pan, and the outline cut shows exact sizes. The pan is made of heavy spun copper and is riveted



No. 395. Pickle Pan.

to stout brass wire, extending entirely through a wooden handle, terminating with a hook, which allows the pan to be hung up, or maintains it on a level when placed upon a bench, making it impossible to upset the pan.



Exact Sizes

No. 395, 4 inches diameter, $1\frac{3}{16}$ inches deep, with hook.
No. 396, $1\frac{1}{16}$ inches diameter, ⅞ inches deep, with hook.
No. 397, 3 inches diameter, 1⅛ inches deep, with hook.
No. 398 Pickle Pan and Melting Ladle is identical with No. 396 as to size and shape, but is not provided with hook on handle.

PRICES:

No. 395. Copper Pickle Pan, 4-inch, with hook, ... 75 cents
No. 397. Copper Pickle Pan, 3-inch, with hook, ... 50 cents
No. 396. Copper Pickle Pan and Melting Ladle, $1\frac{3}{16}$-in., with hook, 35 cents
No. 398. Copper Pickle Pan and Melting Ladle, $1\frac{3}{16}$-in., without hook, 25 cents

Pickling Solution. A desirable solution for pickling gold and silver is composed of sulphuric acid, 1 part, and water, 15 to 20 parts.



SOLDERING FLUXES.

B. D. M. CO.'S SOLDERING FLUID. A perfect fluid for soldering gold or silver. It is a substitute for borax and causes solder to flow smoothly. Put up in box for mailing.

PRICE:

B. D. M. Co.'s Soldering Fluid, per bottle, . . 15 cents.



ELECTRIC CLEANSING FLUX PASTE. A Soldering Flux in Paste Form.—Applied with a brush. A very thin coating of Electric Cleansing Flux Paste imparts a clean surface to the gold and causes solder to flow readily and uniformly. *"Superior to any flux I have ever used,"* writes an expert gold worker.

PRICE:

Electric Cleansing Flux Paste, per jar, . . 25 cents.

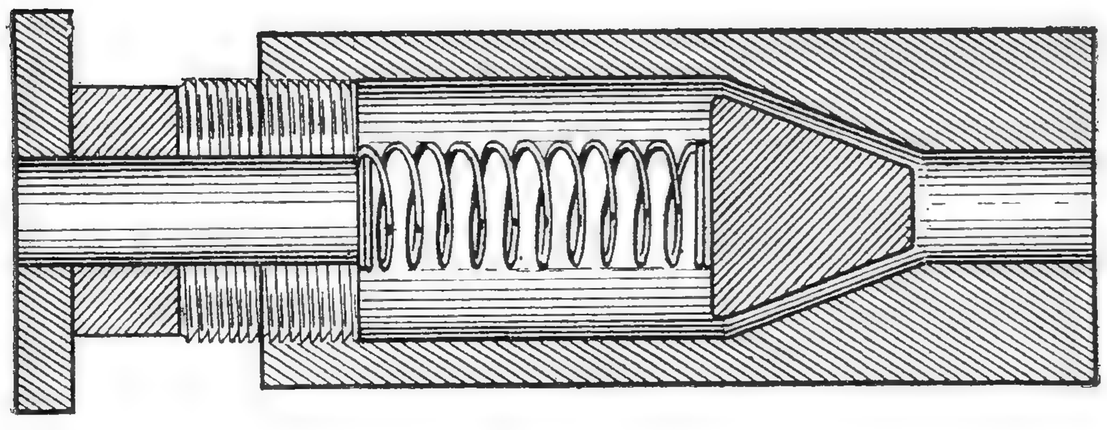


PREPARED BORAX STICK. An excellent soldering Flux. This is a prepared flux for use in soldering gold or silver. It is used by scraping or rubbing a small quantity on a borax holder and mixing with water, the same as ordinary borax.

This flux will not boil.

PRICE:

Prepared Borax Stick, ... 10 cents.



No. 103.

No. 103. AIR PRESSURE RELIEF VALVE. This relief valve is constructed wholly of brass, is graduated and indexed to resist pressure from 0 to 25 lbs. The base end is threaded to fit ⅜″ gas pipe fittings, and can be fitted to any air reservoir, or connected to main air pipe line in laboratory. Illustration full size. Price, $1.50.

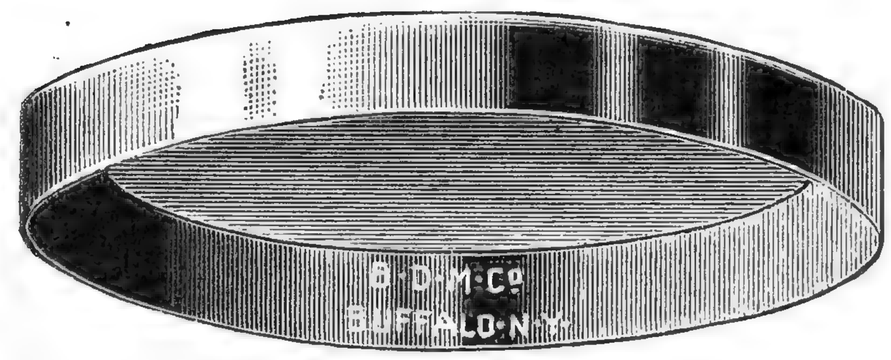


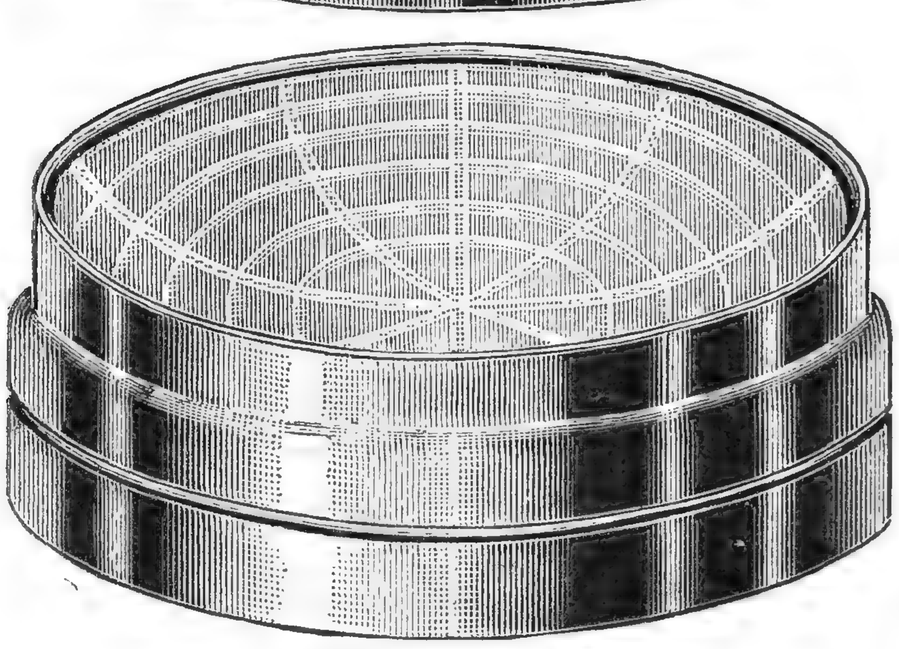
Trim Glass Tray—Cut two-thirds size.

B. D. M. CO.'S TRIM GLASS TRAY. A glass tray, or watch material glass; inside surface ground, with heavy brass lid, polished and nickel plated, or oxidized copper. It also makes a neat receptacle for mixing borax, the cover serving to protect the contents from dust and dirt.

PRICE:

B. D. M. Co.'s Trim Glass Tray, ... 40 cents



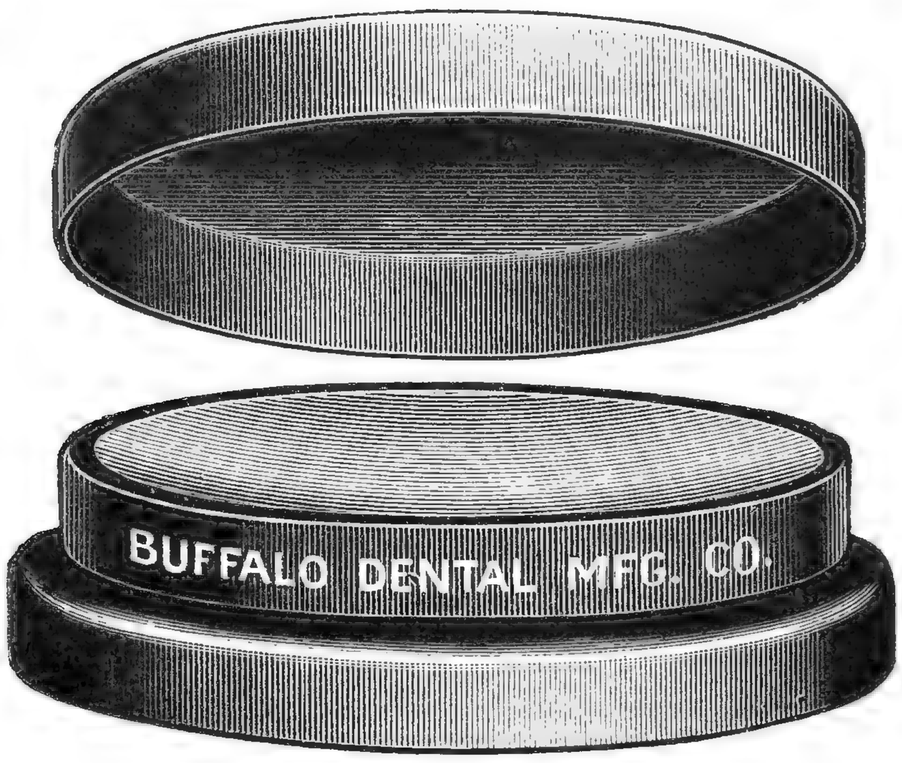


Glass Borax Holder.

GLASS BORAX HOLDER. WITH WOOD BASE. A concave ground glass dish 2⅞″ diameter securely fitted in a wood base, 3½″ diameter, 1¾″ high, with a metal cover fitted to the top to exclude dust or dirt and prevent evaporation; sufficiently heavy to prevent upsetting or slipping on the bench when preparing solution.

PRICE:

Glass Borax Holder, . . . 35 cents



Compressed Slate Borax Holder.

COMPRESSED SLATE BORAX HOLDER. As its name implies, it is composed of compressed ground slate, cylindrical in shape, minimizing the liability of breakage; has a concave surface 3 inches in diameter, with base 3⅝ inches in diameter; height one inch; fitted with metal cover to protect contents.

PRICE:

Compressed Slate Borax Holder, . 35 cents

IMPERIAL CLEANSING POWDER. Especially desirable for removing from the hands the grime incident to shop work.

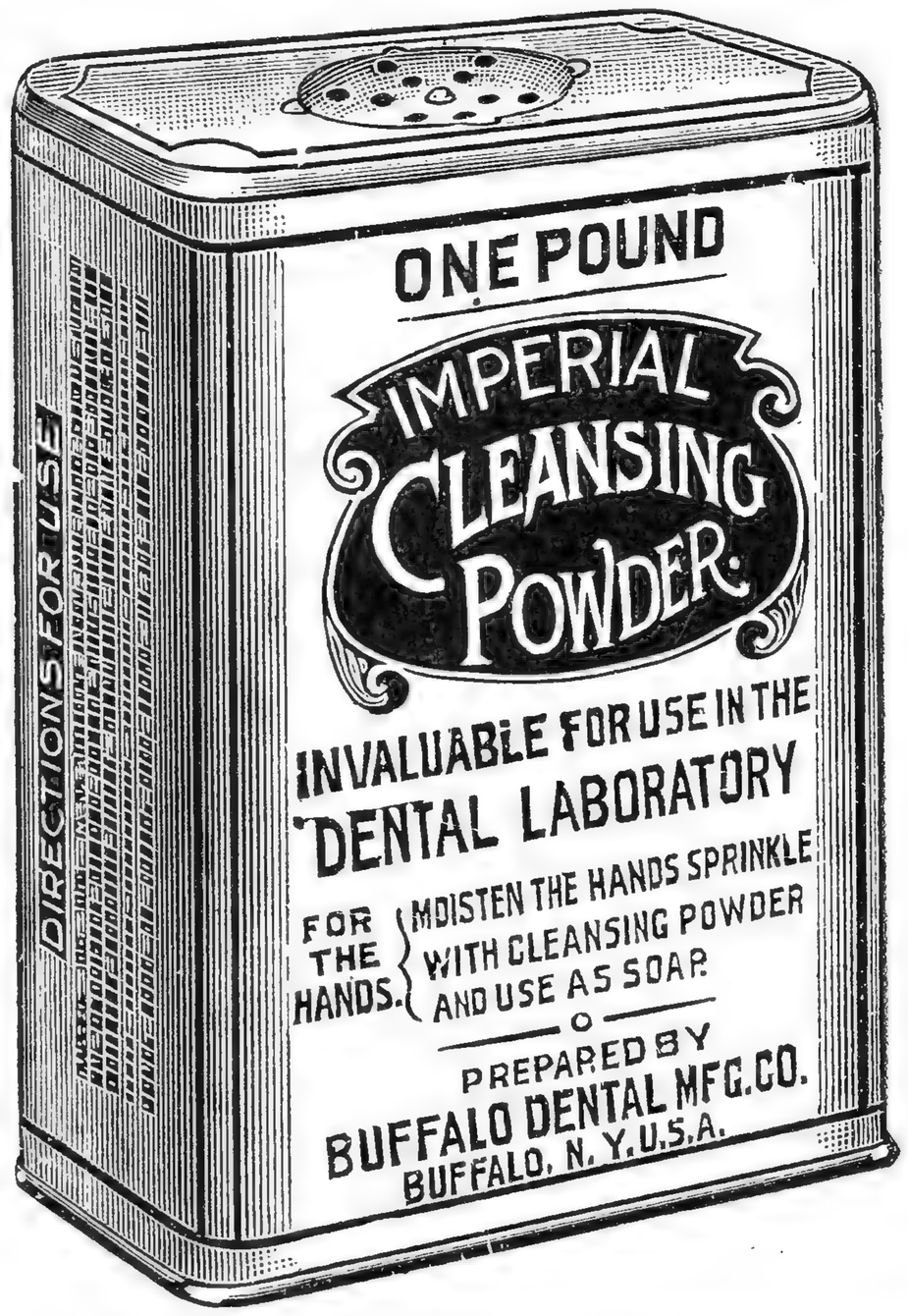
Put up in one pound and half pound tin cans, with sprinkler tops.

Trial size free by mail on request.

PRICES:

Imperial Cleansing Powder,
one pound can, ... 25 cents.

Imperial Cleansing Powder,
half pound can, ... 15 cents.

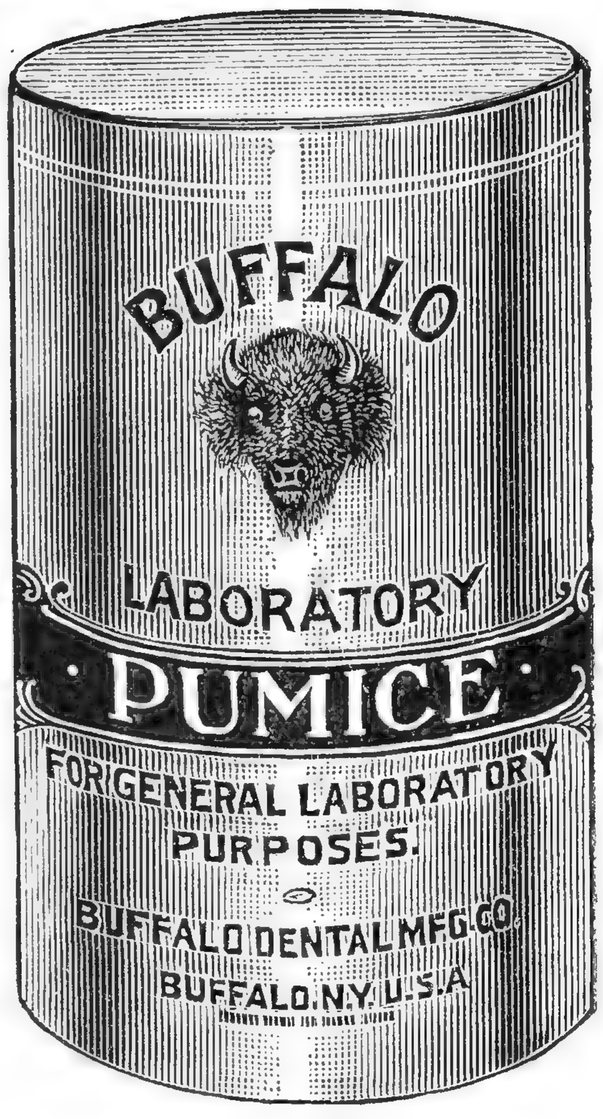


BUFFALO LABORATORY PUMICE. For cleaning the work after the pickling bath and for general laboratory use.

In one pound boxes.

PRICE:

Buffalo Laboratory Pumice, per box, . . 15 cents.



BINDING WIRE. Small Spools.

PRICE (per spool):

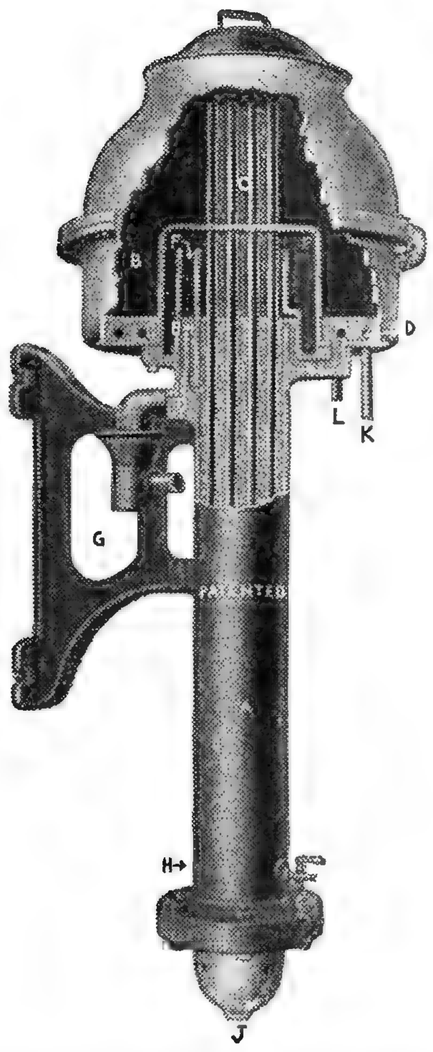
Black Iron Wire, gauges 26, 28, 30, 32, 34, 36, . 5 cts.
Tinned Iron Wire, gauges 26, 28, 30, 32, 34, 36, . 5 cts.
Soft Brass Wire, gauges 26, 28, 30, 32, 34, 36, . 10 cts.
Soft Copper Wire, gauges 26, 28, 30, 32, 34, 36, . 10 cts.

BINDING WIRE. Large Spools. Quarter pound.

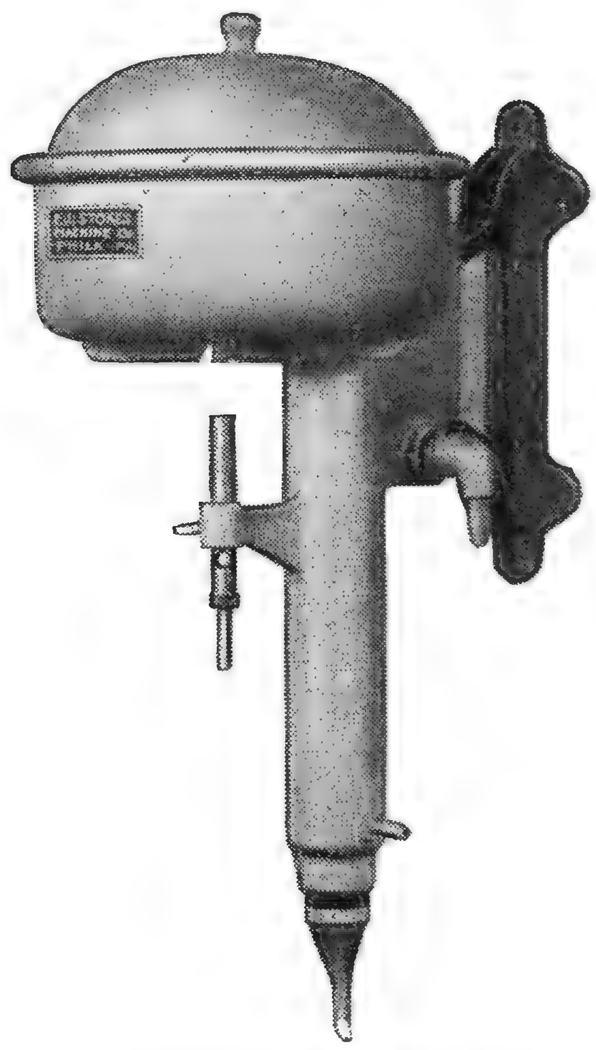
PRICE (per spool):

No. 26 Soft Brass, ... 25 cents.
No. 28 Soft Brass, ... 25 cents.
No. 32 Soft Brass, ... 40 cents.
No. 26 Soft Copper, ... 25 cents.
No. 28 Soft Copper, ... 25 cents.
No. 34 Soft Copper, ... 55 cents.
No. 28 Annealed Steel, ... 25 cents.
No. 30 Annealed Steel, ... 25 cents.
No. 32 Annealed Steel, ... 25 cents.
No. 34 Annealed Steel, ... 25 cents.
No. 36 Annealed Steel, ... 30 cents.

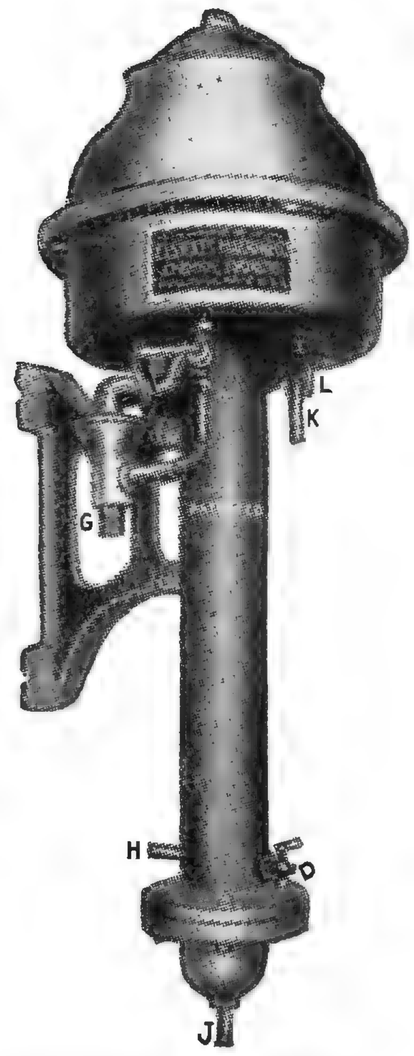
WATER STILLS



Showing General Construction.



Nos. 0 and 00 for Gas.



Nos. 1 to 5 for Steam.

STOKES AUTOMATIC WATER STILLS. The novel construction of these Automatic Stills accomplishes two results: First:—They use the heat generated in the still for preheating the incoming raw water to the boiling point. By preheating the feed water before it enters the distilling chamber, ammonia and other gases, due to impurities in the raw water, are largely liberated and escape into the atmosphere through an opening in the condenser provided for that purpose.

They are made in seven sizes. The No. 0 and No. 00 are gas heated. The Nos. 1 to 5 are steam heated, requiring live steam under pressure of from 20 to 40 pounds at the still. The heating coil is made of copper and is designed to stand a steam pressure of 250 pounds. They are so arranged they may be readily detached for cleaning. The sectional illustration shows the general construction. The condensing cylinder and distilling chamber are of cast iron, the latter galvanized to resist corrosion. The condenser tubes are of brass, lined both inside and outside with block tin. These are held with screw ferrules so the tubes can be removed if occasion demands. The manhole cover on top is copper, tin lined. All stills are of the bracket type effecting great economy in space and offering opportunity for cleanliness.

CAPACITY

Size	Hourly Capacity	Method of Heating	Weight	Height	Price
0	½ gallon	Gas	35 lbs.	24″	$18.00
00	1 gallon	Gas	35 lbs.	24″	20.00
1	5 gallons	Steam	275 lbs.	3′–6″	100.00
2	10 gallons	Steam	325 lbs.	4′–6″	150.00
3	25 gallons	Steam	750 lbs.	7′	250.00
4	60 gallons	Steam	1200 lbs.	7′–6″	450.00
5	100 gallons	Steam	1500 lbs.	7′–6″	600.00

Apparatus and Material illustrated in this catalog are carried in stock by most prominent dealers in chemists', assayers', jewelers' and machinists' supplies throughout the world. If your local dealer cannot furnish promptly the article you desire, direct inquiry is solicited and will receive immediate and careful attention.

STICK ROUGE. For final polishing and coloring of gold and silver. In sticks about 3 inches long by ¾-inch diameter. Wrapped in tin foil and boxed.

PRICE:

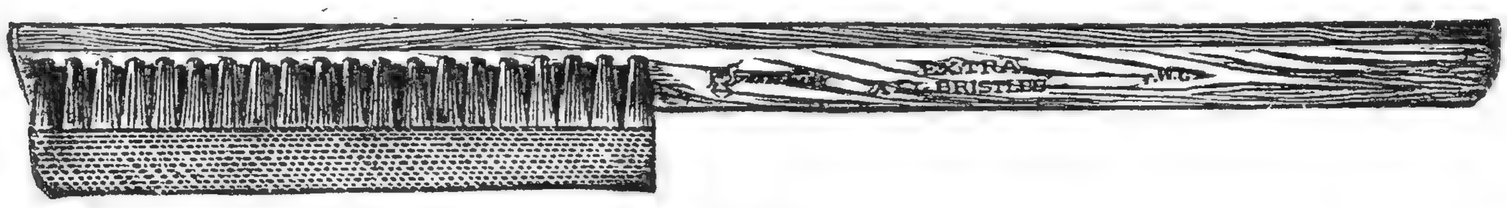
Rouge, per stick, ... 10 cents.

TRIPOLI. In cakes. Wrapped in tin foil. For polishing out file marks or scratches in jewelry or metal work.

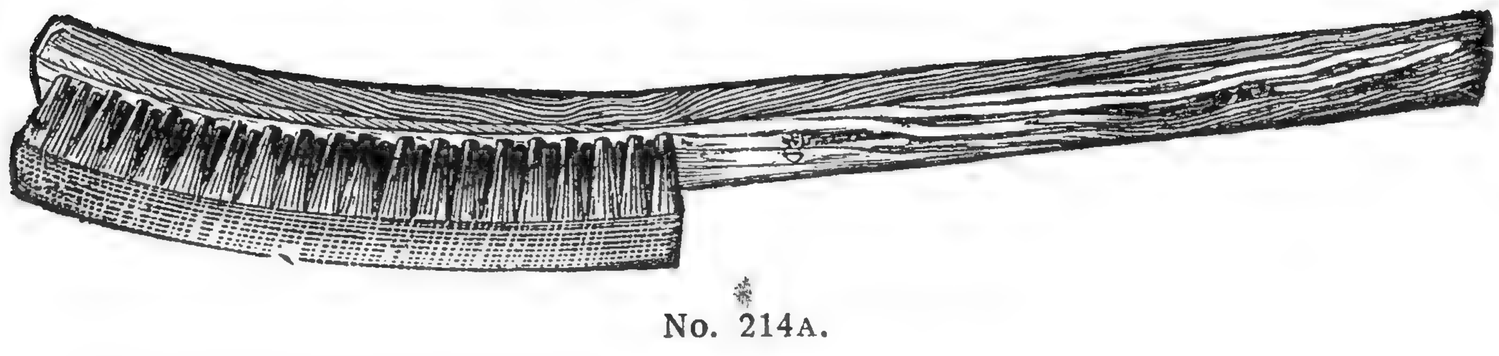
PRICE:

Tripoli, per cake, ... 5 cents.

SCOURING BRUSHES. For use in connection with Buffalo Laboratory Pumice in cleaning and brightening metal work of all kinds after pickling.



No. 208A.



No. 214A.

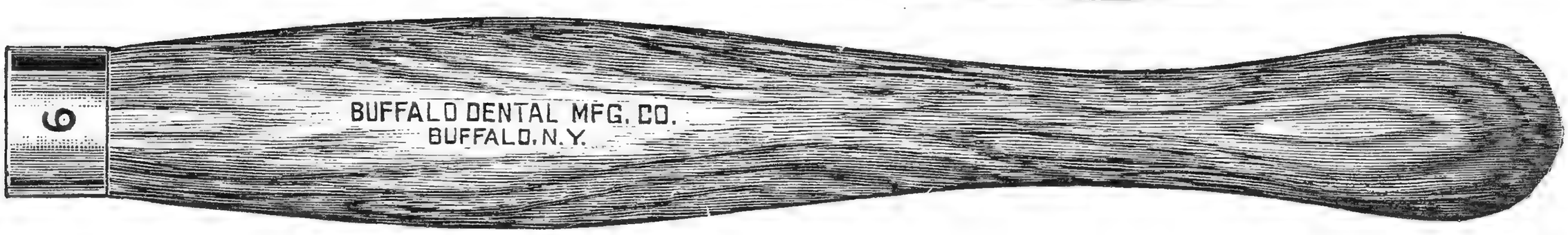
PRICES:

No. 208A. Scouring Brush, Four Rowed, Straight Handle, . . 40 cents.
No. 214A. Scouring Brush, Four Rowed, Curved Back, . . . 40 cents.

FILE HANDLES. Made in five lengths with proportionately varying diameters, with metal ferrules to prevent splitting.

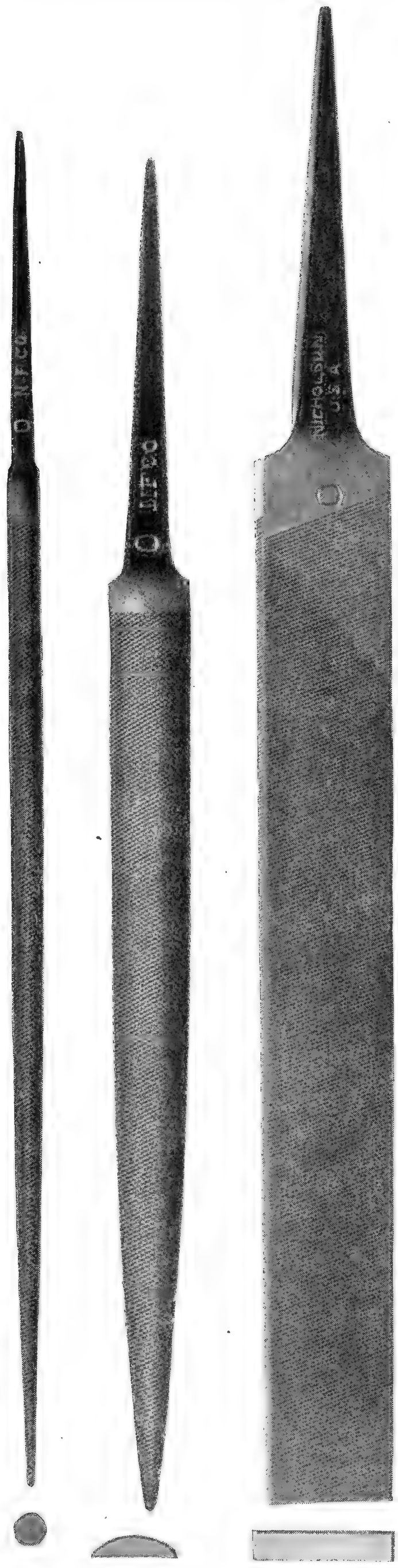
No. 1. 4¾ in. long, $1\frac{3}{16}$ in. diam.
No. 2. 4½ in. long, $1\frac{1}{16}$ in. diam.
No. 3. 4¼ in. long, 1 in. diam.
No. 4. 3¾ in. long, ¾ in. diam.
No. 5. 5⅛ in. long, $1\frac{1}{16}$ in. diam.
No. 6. 5⅛ in. long, $\frac{9}{16}$ in. diam.





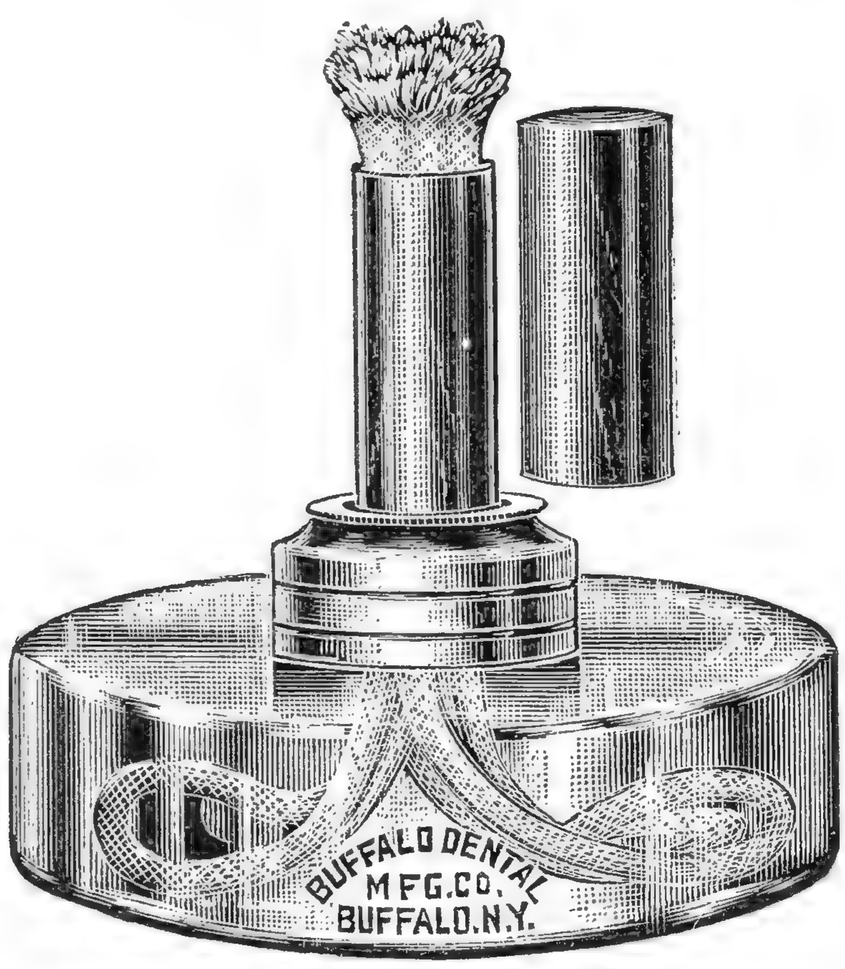
PRICE:

File Handles, each, ... 5 cents



Round. Half-Round. Flat.

FILE-OSOPHY. "Before using the file, it should first of all be properly handled, not, as is too often the case, by driving the handle half-way down upon the tang and thereby doubling the chances of breaking it, but by forcing it well up to the shoulder. Some of the file handles found on the market will not stand this amount of driving without splitting; in such cases the tang of an old or worn-out file of similar dimension should be heated, taking care, of course, not to draw the temper, and the hole in the handle burned out to nearly the desired size and shape, before driving it upon the tang. It not infrequently happens that the tang hole is not drilled central or is badly out of line; this may also be corrected by using a heated tang. Of the many file handles of special construction hereto devised there are none which have, as yet, combined that simplicity, utility and economy necessary to take the place of the ordinary wooden handle; nor do we think it possible to improve, for most applications of the file, upon a wooden handle that is conveniently formed and properly ferruled, provided it be firmly affixed and carefully used."



No. 2. BUFFALO ALCOHOL SOLDERING LAMP. This lamp is composed of a heavy glass font, with a base measurement of 3¾ inches, surmounted with an extra large burner tube which will accommodate four strands of spirit lamp wicking, producing a large brush flame suitable for soldering in the open flame, or by means of a mouth blowpipe. The extinguisher fits snugly to the burner tube, thereby preventing evaporation of the alcohol when not in use. Illustration is half size.

PRICE:

No. 2. Buffalo Alcohol Soldering Lamp . . . $0.60

FILES FOR METAL WORK. The Nicholson File Co.'s Files are widely known as the most desirable for gold workers and fine tool and die making. They are offered as best meeting the requirements of the metal worker.

REDUCED PRICE LIST. FILES FOR METAL WORK.

	Flat				Half-Round				Round			
No.	00 to 2	3 to 4	5	6	No.	00 to 2	3 to 5	6 to 8	No.	00 to 2	3 to 5	6 to 8
3 in.	$2.20	$2.30	$2.40	$2.60	3 in.	$2.30	$2.40	$2.60	3 in.	$1.05	$1.05	$1.05
3½ in.	2.45	2.60	2.75	3.00	3½ in.	2.50	2.70	2.95	3½ in.	1.25	1.25	1.25
4 in.	2.70	2.85	3.00	3.25	4 in.	2.75	3.40	3.70	4 in.	1.75	1.85	1.95
4½ in.	3.15	3.35	3.55	3.85	4½ in.	3.10	3.90	4.30	4½ in.	1.90	2.05	2.25
5 in.	3.45	3.65	3.95	4.40	5 in.	3.45	4.30	4.65	5 in.	2.05	2.30	2.50
6 in.	4.10	4.40	4.65	5.00	6 in.	4.40	5.25	5.90	6 in.	2.55	2.85	3.15

Effective November 1, 1913.

Elements	Symbol	Specific Gravity	Specific Heat	Atomic Weight 0=16	MELTING POINTS Deg. F	MELTING POINTS Deg. C	Boiling Pt. Fahrenheit
ALUMINUM	Al	2.56	.1970	27.1	1217.7	658.7	....
ANTIMONY	Sb	6.71	.0508	120.2	1166	630	....
Argon	A	.....	.....	39.9	306	188	....
Arsenic	As	5.67	.....	75.0	1560	850	....
Barium	Ba	3.75	.1200	137.37	1560	850	....
Beryllium		.....	.....	.....	> 3270	> 1800	....
Bismuth	Bi	9.80	.0308md	208.0	520	271	....
Boron	B	.....	.....	11.0	4000	2200	
					4500	2500	.....
Bromine	Br	.....	1.1110	79.92	+18.9	—7.3	137
CADMIUM	Cd	8.60	.0567	112.40	609.6	320.9	1580
Cæsium	Cs	1.88	.....	132.81	79	26	.....
Calcium	Ca	1.57	.170	40.09	1490	810	.....
Carbon	C	.....	.....	12.0	> 6500	> 3600	
					for P=1 At	for P=1 At	.....
Cerium	Ce	.....	.....	140.25	1184	640	.....
Chlorine	Cl	.....	.....	35.46	—150.5	—101.5	.....
Chromium	Cr	6.80	.120	52.1	2750	1510	.....
Cobalt	Co	8.50	.110	58.97	2714	1490	.....
Columbium (Niobium)	Cb	.....	.....	93.5	4000	2200 ?	.....
COPPER	Cu	8.82	.0951	63.57	1981.5	1083.0	.....
Dysprosium	Dy	.....	.....	162.5	.....	.....	.....
Erbium	Er	.....	.....	167.4	.....	.....	.....
Europium	Eu	.....	.....	152.0	.....	.....	.....
Fluorine	F	.....	.....	19.0	—369	—223	.....
Gadolinium	Gd	.....	.....	157.3	.....	.....	.....
Gallium	Ga	.....	.....	69.9	86	30	.....
Germanium	Ge	.....	.....	72.5	1756	958	.....
Glucinum	Gl	2.07	.580	9.1	.....	> Ag	.....
GOLD	Au	19.32	.0324	197.2	1945.5	1063.0	.....
Helium	He	.....	.....	4.0	< —456	< —271	.....
Hydrogen	H	.....	3.4090	1.008	—434	—259	.....
Indium	In	7.42	.057	114.8	311	155	.....
Iodine	I	.....	.....	126.92	236.5	113.5	347
Iridium	Ir	22.42	.033	193.1	4170	2300	.....
IRON	Fe	7.86	.1298 cst .1138 wt	55.85	2768	1520	.....
Krypton	Kr	.....	.....	81.8	—272	—169	.....
Lanthanum	La	6.20	.045	139.0	1490	810 ?	.....
LEAD	Pb	11.37	.0314 .0402md	207.1	621.1	327.4	1904
Lithium	Li	0.59	.941	7.0	367	186	.....
Lutecium	Lu	.....	.....	174.0	.....	.....	.....
Magnesium	Mg	1.74	.250	24.32	1204	651	.....
Manganese	Mn	8.00	.120	54.93	2237	1225	.....
MERCURY	Hg	13.59	.0333	200.0	—37.7	—38.7	675
Molybdenum	Mo	8.60	.072	96.0	4500	2500 ?	.....
Neodymium	Nd	.....	.....	144.3	1544	840	.....
Neon	Ne	.....	.....	20.0	—423	—253	.....
NICKEL	Ni	8.80	.1086	58.68	2646	1452	.....
Nitrogen	N	.....	.2438	14.01	—346	—210	.....
Osmium	Os	22.48	.031	190.9	4900	2700	.....
Oxygen	O	.....	.2175	16.0	—360	—218	—204
PALLADIUM	Pd	11.50	.059	106.7	2820	1549	.....
Phosphorus	P	.....	.....	31.0	111.4	44	554
PLATINUM	Pt	21.50	.0324	195.0	3191	1755	.....
Potassium	K	0.87	.170	39.1	144	62.3	1292
Praseodymium	Pr	.....	.....	140.6	1725	940 ?	.....

Elements	Symbol	Specific Gravity	Specific Heat	Atomic Weight 0=16	MELTING POINTS Deg. F	MELTING POINTS Deg. C	Boiling Pt. Fahrenheit
Radium	Ra	.....	.....	226.4	.....	?	.....
Rhodium	Rh	12.10	.058	102.9	3525	1940	.....
Rubidium	Rb	1.52	.077	85.45	100	38	.....
Ruthenium	Ru	12.26	.061	101.7	> 3550	> 1950	.....
Samarium	Sa	.....	.....	150.4	2370	1300	.....
					2550	1400	
Scandium	Sc	.....	.....	44.1	.....	?	.....
Selenium	Se	.....	.....	79.2	422—428	217–220	.....
Silicon	Si	.....	.....	28.3	2588	1420	.....
SILVER	Ag	10.53	.0570	107.88	1761	960.5	.....
Sodium	Na	*0.97	.290	23.0	207.5	97.5	.....
Strontium	Sr	2.54	.074	87.62	.....	> Ca < Ba ?	.....
Sulphur	S	.....	.2026	32.07	S1 235.0	112.8	824
			.2340 md		S11 246.6	119.2	
					S111 224.2	106.8	
Tantalum	Ta	10.80	.....	181.0	5160	2850	.....
Tellurium	Te	6.25	.047	127.5	846	452	.....
Terbium	Tb	.....	.....	159.2	.....	.....	.....
Thallium	Tl	11.85	.034	204.0	576	302	.....
Thorium	Th	7.7	.028	232.42	> 3090	> 1700	.....
					< Pt	< Pt	.....
Thulium	Tm	.....	.....	168.5	.....	.....	
TIN	Sn	7.29	.0562	119.0	449.4	231.9	
			.0637 md				.....
Titanium	Ti	.....	.130	48.1	3450	1900 ?	.....
TUNGSTEN	W	19.10	.033	184.0	5430	3000	.....
Uranium	U	18.70	.028	238.5	.....	?	.....
Vanadium	V	5.50	.....	51.2	3150	1730	.....
Xenon	Xe	.....	.....	128.0	220	140	.....
Ytterbium (Neoytterbium)	Yb	.....	.....	172.0	.....	?	.....
Ytterium	Y	.....	.....	89.0	.....	?	.....
ZINC	Zn	7.15	.0956	65.37	786.9	419.4	1904
Zirconium	Zr	4.15	.066	90.6	3100	1700 ?	.....

BUREAU OF STANDARDS JUNE 15, 1912.

The values of the melting points used by the Bureau of Standards as standard temperatures for the calibration of thermometers and pyrometers are indicated in CAPITALS. The other values have been assigned after a careful survey of all the available data.

As nearly as may be, all values, in particular the standard points, have been reduced to a common scale, the thermodynamic scale. For high temperatures, and for use with optical pyrometers, this scale is satisfied very exactly by taking C2=14500 In the formula for Wein's law connecting I, monochromatic luminous intensity of wave length, λ and T, absolute temperature: $\log I/I_1 = C_2 \lambda \log e (I/T_1 - I/T)$. For all purposes except the most accurate investigations, the thermodynamic scale is identical with any of the gas scales.

NOTES ON GASES

Gas	Cu. Ft. Per Pound	Heating Value B. T. U.'S Per Cu. Fr. Fahrehheit	Specific Gravity	Density
Acetylene	13.750	1556	.....	
Air	12.333	.....	1.000	
Alcohol, grain, Vapor	7.775	1684	.....	
Alcohol, wood, Vapor	11.203	1684	.....	
Aldehyde, Vapor	8.085	1612	.....	
Ammonia	21,000	.....	.....	
Benzine, Vapor	4.808	3818	.....	
Blast Furnace	12,650	90	.....	
Butane	6.245	3415	.....	
Butylene	6.414	3300	.....	
Carbon, Vapor	14.930	282	.....	
Carbon Dioxide	8.147	1342	1.5241	
Carbon Disulphide, Vapor	4.706	.....	.....	
Carbon Monoxide	12.804	337	0.9670	
Coal Gas	31.600	680	0.340 to 0.650	
Cyanogen	6.880	.....	1.8060	
Ethane	11.950	1860	.....	
Ether, Vapor	4.860	3264	.....	
Ethylene	12.580	1670	.....	
Ethylene Chloride, Vapor	3.631	.....	.....	
Fusel Oil, Vapor	3.936	.....		
Hydrogen	178.230	344	0.0693	
Hydrogen Sulphide	10.370	.....	.....	
Methane	22.301	1049	.....	
Natural, Average	22.500	1000	.....	
Nitrogen	12.752	.....	0.9714	
Oxygen	11.209	.....	.....	
Producer	13.333	125 coke 145 hd-sft cl	1.1057	
Propane	8.148	2627	.....	
Propylene	8,540	2500	.....	
Water Gas	22.000	300	.....	
Water, Vapor	19.912	.....	.....	

Is found by multiplying specific gravity by 0.0012932.

The volume of any gas at constant temperature is inversely proportional to the pressure upon it; that is, the pressure multiplied by the volume is constant.

A gas expands when heated, the volume being proportional to the absolute temperature.

A gas at 32 deg. F. under constant pressure increases or decreases 1—491.2 or .0002036 of its volume for every degree F. change of temperature.

To obtain the absolute temperature of a gas, add 460 deg. to the given degrees F.

A cubic foot of dry air at 32 deg. F. at sea level weighs .08073 lbs.

The weight of a cubic ft. of any gas at 32 deg. F. and at atmosphere pressure is found by multiplying its specific gravity (air=1) by .08073.

An average value for the specific gravity of illuminating gas is .5.

The weight of gas per cu. ft. at 32 deg. F. may be found by multiplying its molecular weight by .00559.

The B. T. U. is a British Thermal Unit of heat and is the amount of heat required to raise the temperature of one pound of water 1 deg. F.

A calorie is the French unit of heat and is the amount of heat required to raise the temperature of one kilogram of water 1 deg. C.

1 B. T. U.=252 calories.
1 Calorie =3.968 B. T. U.
1 B. T. U. per cu. ft. =.899 calorie per cu. meter.
1 Calorie per cu. meter =.1124 B. T. U. per cu. ft.
The mechanical equivalent of heat is 778 ft. lbs. B. T. U.
The fundamental formula in combustion is:

$$T.=\frac{B.\ T.\ U.}{W.\ \times\ Sp.\ H.}$$

Where
T.=Flame temperature.
Sp. H.=Specific heat of products of combustion.
W.=Weight of products of combustion.
B. T. U.=Heat obtained by combustion.

The Atomic heat is defined as the atomic weight multiplied by the specific heat, and has the nearly constant value for all gases of 6.4.

After a substance is heated to its melting or boiling point the heat then applied does not raise its temperature, but goes to fuse or vaporize the substance. This heat apparently disappears and is called latent heat of fusion or vaporization, as the case may be.

Radiation from a heated body increases as the fourth power of its absolute temperature.

ABOUT WATER

Water is two parts by volume Hydrogen and one part Oxygen.

Twenty cu. ft. of Hydrogen and ten cu. ft. of Oxygen will make about nine pounds of water.

Eight pounds of Oxygen and one pound of Hydrogen will make nine pounds of water.

8⅓ lbs. of water make a gallon.
231 cu. in. of water make a gallon.
7½ gallons of water make a cu. ft.
1 cu. ft. of water weighs 62⅓ lbs.
1 cu. ft. of water makes 1728 cu. ft. of steam.
2⅓ ft. head of water make one pound per square inch pressure.
Head (height of water) times .433 gives pressure in pounds per square inch.

A cu. ft. of water is heaviest at 39.1 deg. F., its greatest density; its weight decreases per cu. ft. as its temperature rises, due to its expansion.

Gas pressure is measured by water column in U glass and 1.73 inches or 17⅓ tenths equal 1 oz. pressure.

Posted on: September 29, 2019
Edited by: Brian D. Szafranski
of Elma New York USA

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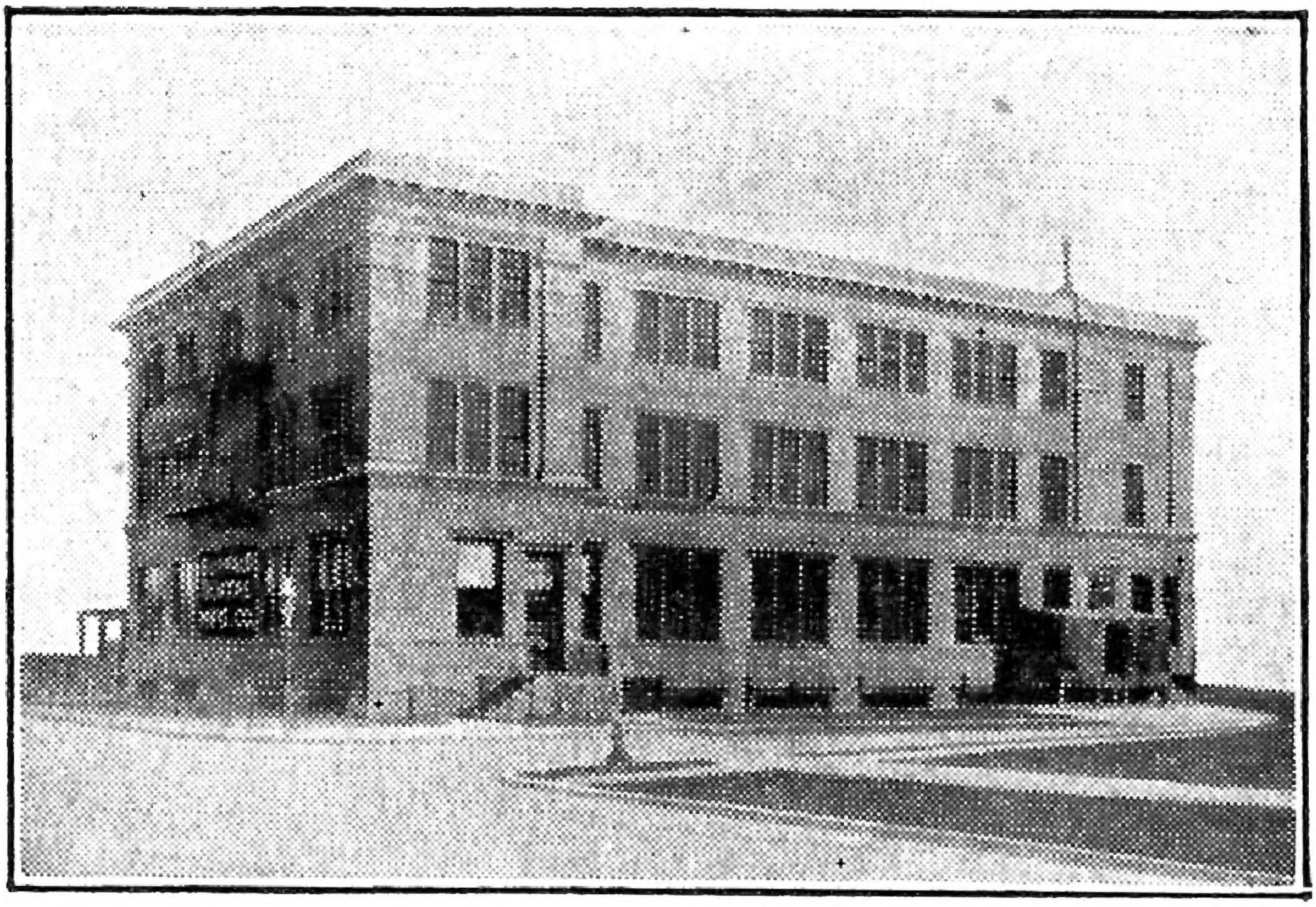
MEMORANDUM

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Work Worth Doing

THE man or woman who does work worth doing is the man or woman who lives, breathes and sleeps that work: with whom it is ever present in his or her soul: whose ambition is to do it well and feel rewarded by the thought of having done it well. That man, that woman, puts the whole country under an obligation.

—*John Ruskin.*



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